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March 21, 2014

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Subject: Olin Chemical Superfund Site, Wilmington, Massachusetts
Response to USEPA Comments Dated September 30, 2014
OU1 /OU2 RI Sections 1-5 Including Stakeholder Comments

On behalf of Olin Corporation (Olin), AMEC Environment & Infrastructure, Inc. (AMEC) respectfully submits the following responses to United States Environmental Protection Agency's (USEPA's) September 30, 2013 comment responses prepared by Nobis Engineering, Inc. (NOBIS) to:

1) Olin's Response to Comments Letter dated July 26, 2013 for USEPA's June 24, 2013 comments on Sections 1 through 5 of the Draft Remedial Investigation Report for Operable Unit 1 and Operable Unit 2, dated April 19, 2013 (OU1/2 RI) for the Olin Chemical Superfund Site in Wilmington, Massachusetts; and

2) Olin's Response to Comments Letter dated September 13, 2013 for USEPA's August 9, 2013 Supplemental Review – Stakeholder Comments, Draft Remedial Investigation Risk Assessment for OU1 and OU2, Olin Chemical Superfund Site.

Below please find the unresolved USEPA comments on the OU1/OU2 RI followed by Olin's initial response, EPA's reply and then Olin's response to that EPA reply. The comments and responses are arranged by section as they were presented by USEPA/ NOBIS. Separate Response to Comments letters are being submitted to USEPA to address comments on the first and second interim deliverables for the Baseline Human Health Risk and the Baseline Ecological Risk Assessment, the latter of which were submitted on July 26, 2013.

If you have any questions concerning this letter, please feel free to contact James Cashwell at (423) 336-4012.

Sincerely,

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USEPA COMMENTS

GENERAL COMMENTS

Entire Document

Comment No. 1: Clarify and standardize the usage of "property", "site", "facility/former facility". Provide a figure that shows the OU1, OU2, and site features, as features mentioned throughout the report are difficult to find on the referenced figures and/or are not included on any figure. Examples are: water bodies, conservation and open space restriction, delta area, on-property and off-property water bodies, Aberjona River, Jewel Drive, Sanmina property, groundwater topographic divide, to name a few. When a site feature is used to make a point, a reference to a figure is needed. In addition, the wording of site features varied based on topic. This is a comment throughout the report. Terminology is not consistent.

Response No. 1: Terminology for Site features will be reviewed for consistency. Figures 1.0-2 (Site Features) and 1.3-1 (Site Features (Current and Historic)) indicate, at different scales, a majority of the referenced features. The border of the conservation area, Jewel Drive, the former Sanmina property will be added. The boundary of OU1 is indicated on Figure 1.0-2. OU2 is not an area, rather is comprised of individual streams and these are all labeled on Figure 1.0-2. It should be unnecessary to reference these two figures each time a site feature is referenced.

USEPA Reply: EPA concurs with the edits to Figure 1.0-2 and 1.3-1. Please insert "see figure x-x for site features" when they're first discussed in a section to help direct the reader. OU2 includes off-property soils in addition to the various streams. This area, EA5, needs to be labeled on the figure.

Olin Response to USEPA Reply: *The reader will be directed to specific Figures for site features when first discussed in a Section. Area EA5 will be added to Figure 1.0-2.*

Comment No. 2: A comprehensive package of updated groundwater data has not been submitted. Olin's Conceptual Site Model (CSM) indicates contaminants migrate 1) via groundwater to South Ditch, and from there by surface water into East Ditch and 2) via deep groundwater to the groundwater beneath the Maple Meadow Brook Wetland (MMBW) with hypothetical potential to eventually discharge to MMBW surface water. Olin asserts that deep groundwater beneath MMBW is not impacting shallow groundwater and surface water in this area. In order to evaluate these conclusions regarding site-related impacts to surface water and sediments, the comprehensive OU3 groundwater. EPA reserves the right to revisit the adequacy of the OU2 sampling efforts and results once the OU3 data has been provided. The CSM needs expanded discussion of groundwater including potential divergent impacts to the two watersheds and town wells.

Response No. 2: We interpret "comprehensive" OU3 groundwater data to mean "all" OU3 groundwater data. As such, a comprehensive OU3 groundwater data package is not required to fully evaluate the nature and extent of impacts or risks associated with OU1/OU2 features or to develop an appropriate conceptual site model for OU1 and OU2.

We do agree that an understanding of the interaction between groundwater and soil, sediment, and surface water is important to the OU1/OU2 RI effort where these different media are in contact with one another. Certainly, all groundwater within the OU3 study area is not in contact with OU1/OU2 features. As we've discussed on numerous occasions, impacted groundwater may be having, or has had, a direct impact on soils, surface water, or sediments in certain portions of the site. We have made this concept clear in the RI document. USEPA has requested submittal of the data to be used in the OU3 data gap analysis currently underway. The CD will be provided upon its completion, which is expected to be in 3rd quarter 2013.

The CSM will be prepared according to these potential interactions to facilitate review of conditions within OU1/OU2. The CSM will be further expanded to facilitate review of conditions within OU3 as part of the OU3 RI reporting effort. To be clear, we do not believe that potential divergent impacts to the watersheds or the Town Wells needs to be described to understand the nature, extent, or risks associated with OU1/OU2 features. Therefore, this information will be provided as part of the OU3 RI reporting effort.

USEPA Reply: EPA does not agree with the statement in your above response *"We have made this concept clear in the RI document."* as that is the basis for the comment (and others on the topic of inclusion of additional groundwater information). Additional clarity and groundwater information is needed to provide the Site setting in the OU1/OU2 RI to more fully evaluate the soils, surface water, sediment, and groundwater associated with these operable units. EPA does not agree that a full evaluation of source areas, leaching, and groundwater impacts can be performed without a complete review of existing groundwater data. It is assumed that these topics will be discussed more fully in the next draft OU1/OU2 RI and in detail in the OU3 RI.

Olin Response to USEPA Reply: *Additional discussion and presentation of groundwater impacts underlying OU1 will be provided to help clarify questions concerning leaching potential of unsaturated soils. Additional discussion of groundwater data will also include more information on the nature, extent and migration of contaminants within shallow groundwater, groundwater flow and interaction of shallow groundwater with surface water within OU1 and OU2 surface water bodies. Additional detail on bedrock and deep overburden groundwater systems will be provided in OU3 as requested.*

Comment No. 4: EPA acknowledges that the inclusion of OU3 groundwater, hydrogeology, geology, etc information into the OU1/OU2 RI may be redundant with the OU3 RI; however, this redundancy is needed so that the relationships between groundwater and surface water are

understood. As we discussed in our meeting on May 28, 2013, topics for inclusion in the OU3 RI (with some discussion in the OU1/OU2 RI) are:

- Relationship with each surface water body
- Leaching analysis
- Groundwater discussions in general met the needs of the OU1/OU2 RI; however, more details are expected under OU3.
- CSL is considered part of the CERCLA site.
- Provide the backup for the DAPL description.
- NDMA formation at low pH via through nitrosation, which involves the formation of nitrosyl cation or similar nitrogen-containing species, such as dinitrogen trioxide, during acidification of nitrite. The nitrosyl cation then reacts with an amine, such as dimethylamine, to form NDMA.
- Saturated soils are part of OU3.
- Groundwater divide
- All groundwater, including DAPL, will be considered as drinking water.
- "Deep groundwater lateral flow patterns are essentially the same as shallow groundwater."

Response No. 4: Responses to each bullet are provided below.

- *Relationship with Each surface water body*: Discussion will be provided in the OU1/OU2 RI report as appropriate.
- *Leaching Analysis*: The leaching analysis has been provided in Appendix J of the OU1/OU2 RI report.
- *Groundwater discussions in general met the needs of the OU1/OU2 RI; however, more details are expected under OU3*: Comment Noted; Olin agrees.
- *CSL is considered part of the CERCLA site*: Olin agrees.
- *Provide the backup for the DAPL description*: We will provide the requested information in the OU3 RI report**.**
- *NDMA formation at low pH via through nitrosation, which involves the formation of nitrosyl cation or similar nitrogen-containing species, such as dinitrogen trioxide, during acidification of nitrite. The nitrosyl cation then reacts with an amine, such as dimethylamine, to form NDMA*: We have addressed the potential formation mechanisms of NDMA in various reports and will provide any new information gained in the OU3 RI report**.**
- *Saturated soils are part of OU3*: Olin agrees**.**
- *Groundwater divide*: We will provide discussion regarding the groundwater divide in the OU3 RI report.

- *All groundwater, including DAPL, will be considered as drinking water*: Olin does not agree that all groundwater should be considered drinking water, and vigorously disagrees that DAPL represents a source of drinking water. The rationale for these positions will be provided in the OU3 RI report.
- *"Deep groundwater lateral flow patterns are essentially the same as shallow groundwater:"* We will discuss this in the OU1/OU2 and OU3 RI reports as appropriate.

USEPA Reply: EPA expects its original comment, "All groundwater, including DAPL, will be considered as drinking water" to stand. The OU1/OU2 RI and the OU3 RI must reflect this approach.

Olin Response to USEPA Reply: *Olin and USEPA have held several meetings to discuss the Site's Groundwater Use and Value Determination to arrive at mutually acceptable criteria for evaluating groundwater uses for OU3. It is Olin's understanding that USEPA recognizes the fact that there are two distinct groundwater features at the site according to the Massachusetts Contingency Plan. USEPA has stated that they consider the current value and use determination a draft determination that will be revised as appropriate upon completion of the OU3 RI. In the interim, Olin maintains that DAPL is a discrete phase that is not groundwater and should not be treated as groundwater in risk assessments. DAPL did not exist as groundwater when it was released, nor is it groundwater currently. This will not affect OU1 /OU2.*

Comment No. 6: In Section 4.0, details on the RI investigation are presented on tables and discussed by depth; however, there needs to be further presentation of the soil data (similar to the presentation of surface water and sediments) by area or site feature to allow a better understanding of contamination in specific areas of the site (for example, OU2 soils west of the property, OU2 soils east of the property, containment area, manufacturing area soils, soils beneath Central Pond sediment, soils beneath West Ditch wetland, soils near Plant B, etc).

Response No. 6: The nature and extent of OU1 contamination is presented by soil depth group (surface, shallow and deep) and by chemical class. Locations where industrial based regional screening levels (RSLs), or other appropriate criteria, have been exceeded are depicted on figures. This format was followed in the preliminary RI and the draft RI reports. To restructure the current RI to present and discuss data by specific areas (e.g., exposure areas, manufacturing areas, or historic disposal areas) would be a very time labor intensive task that would not result in adding clarity to the nature and extent of contamination present at the site above screening levels. Olin will add additional general discussion in the current format to describe areas where primary site-related contaminant concentrations are greater than RSLs.

USEPA Reply: EPA disagrees that breaking down the soil evaluation by specific areas would not provide clarity to the discussions. On the contrary, breaking down the

evaluation would allow for a better connection to the HHRA areas. When data is presented by massive areas, then data in specific areas, "hotter" spots, inaccessible areas beneath sediment, or in areas no longer representative of site conditions but not excavated (i.e. the VOC and VPH data from the AVSE treatment area), are hidden. As the current draft OU1/OU2 RI presents the surface water and sediment data broken down, it is expected that the soil data will also be presented similarly.

Olin Response to USEPA Reply: *As discussed with USEPA, Olin will not re-organize the entire soil description which would require re-doing all the current RI tables and text. However to meet the objective of USEPA's comment Chemicals of Interest that exceed RSLs for specific areas will be identified and described in general terms by depth and by area. These specific areas include the former Lake Poly, TMP area under the parking lot located on the northeast portion of the property; the former VPH/EPH area and Plant B where the former AS/SVE system operated, the lower South Ditch EA5 area, Other areas where impacts have been noted related to railroad activities will also be described including arsenic and PAHs along Pan AM property and portions of EA5 near the MBTA rail line.*

Section 3.0

Comment No. 13: There should be a section on bedrock hydrogeology, indicating direction of flow etc, in bedrock.

Response No. 13: The bedrock hydrogeology and direction of groundwater flow in bedrock has no direct bearing on OU1/OU2 and will be addressed in OU3.

USEPA Reply: Bedrock hydrogeology and groundwater flow direction are site characteristics that need to be included in the overall Site discussion. Given the interactions between surface water and groundwater, the text should explain why bedrock hydrogeology doesn't have any bearing on OU1 and OU2 RI discussions and that it will be fully described in the OU3 RI.

Olin Response to USEPA Reply: *Discussion of the shallow groundwater interactions with OU1/OU2 surface water will be detailed in the Nature and Extent (Section 4) of the draft OU1/OU2 RI and CSM. Additional discussion of the general hydrogeologic setting and the general relationship between bedrock hydrology and overburden groundwater will be further discussed. Discussion of why bedrock does not have a direct bearing on OU1 and OU2 will be added, acknowledging that bedrock will be fully described under the OU3 RI.*

Comment No. 15: Geologic data from previous borings should be used to supplement the existing dataset and discussion so that Section 3.0 includes all applicable data. In several locations, such as the first paragraph of Section 3.2.1 (page 3-2), the reader is referred to the previous FRI for additional geological detail. Given that the RI's extensive drilling program was performed after the FRI, it is assumed that the FRI's geologic descriptions are less complete. It

was expected that the RI investigation may have modified the FRI findings and those complete observations would be included in the RI.

Response No. 15: The statement in question was that *"Additional detail on both overburden and bedrock geology for the Site in general is provided in the Draft FRI (MACTEC, 2007a)."* The OU1 /OU2 RI report provided updated geologic descriptions and cross sections for the on-Property areas where borings were installed. Consequently, the OU1/OU2 RI report does not discuss geology of the entire **Site** (emphasis added) and the reader is referred to that document for those additional discussions (for example the Western Bedrock Valley, Main Street Saddle, bedrock, etc.)

The RI investigation generally confirmed the FRI findings.

USEPA Reply: The entire geology section and the cross-sections describe only the 400-series borings and refer to the FRI for additional detail (note that the FRI was not formally commented on and is not an accepted document). Information in the document is relevant, but must be transferred to the OU1/OU2 RI. The OU1/OU2 RI must be a complete and standalone document to allow for EPA decision-making. The historical soil stratigraphy is relevant because it should not have changed, and the entire data set of both old and new borings should have been integrated into the discussion as a complete discussion. The discussion of non-OU1 Site features sidesteps this primary issue. It is difficult to have two documents – one discussing the historical setting and one discussing current action; both old and new information need to be merged together to allow for a complete picture. EPA expects that the next draft OU1/OU2 RI will include this information.

Olin Response to USEPA Reply: *As stated, the OU1 RI generally confirmed FRI findings with regards to geology. The FRI provides considerable additional detail on geologic features that are not necessarily germane to the geologic and hydrogeologic setting of OU1/OU2 (such as the seismic studies to define the bedrock topography underling DAPL pools and the western Bedrock valley, the details of petrography studies and classification of bedrock lithologies, locations of bedrock outcrops, etc) and the FRI was referred to as a source of additional information that included these and other details. Additional detail and descriptions of geology from the FRI and the RI Work Plan will be added to the draft OU1/OU2 RI report so that USEPA has a standalone document with sufficient detail for EPA decision making.*

Comment No. 16: Synoptic groundwater level measurements should be compared to surface water level measurements to evaluate the interaction between groundwater and surface water. Water elevations in surface water bodies such as the MMBW should be included in synoptic water level rounds.

Response No. 16: Stage elevations of the various streams are not surveyed. Stream piezometers were installed in accordance with the RI work plan to evaluate heads immediately below the physical stream bottom by measurement of the groundwater level inside the piezometer to the surface water outside. The piezometers installed in sapric peat

below MMBW did not yield good information since the peat does not yield water easily. Piezometers in peat take a very long time to equilibrate and do not respond well to short term fluctuations in water levels or piezometeric pressures. Data from South Ditch stream piezometers are measured as part of the IRSWP and that data can be tabulated.

USEPA Reply: Olin should include South Ditch water levels inside and outside piezometers in the OU1/OU2 RI Report. The data should be tabulated and included in the report. In addition, the elevation data and chemistry data, as available, from the West Ditch piezometers, those installed in Landfill Brook, and the MMBW piezometers (with the caveat noted by Olin) should also be included.

Olin Response to USEPA Reply: *Water levels from the South Ditch piezometers are summarized in SASRs and will be tabulated in the draft OU1/OU2 RI. Water levels from MMBW piezometers are summarized in Table 2.3-3 of the draft OU1/OU2 Report. Piezometers were not installed in Landfill Brook or the West Ditch.*

Section 4.0

Comment No. 18: In Section 4.1.3 and 4.1.4, surface water and sediment analytes are not compared to any criteria. Because of this, it is difficult to determine contaminant distribution from looking at Figures 4.1-29 through 4.1.42. In addition, the tables associated with the surface water and sediment results do not provide comparison levels or flag any anomalous results. Appropriate reference criteria should be used for comparison for both surface water and sediment. Tables 4.2-4 through 4.2-10 should compare results to federal and state sediment/surface water screening benchmarks and to background where appropriate. Please move the specific sediment and surface water sample results to a separate appendix in the same format as the Appendix F presentation of the individual soil sample results. Note both this recommended additional appendix and Appendix F should show comparison levels and flag exceedances (See Comment 218).

Response No. 18: The surface water and sediment data are screened in the human health and ecological selection of chemicals of potential concern in subsequent sections of the report. Ambient Water Quality Criteria will be presented for detected parameters in surface water. There are not corresponding national or state criteria for sediment. The criteria to be used in discussion of surface water and sediments results will be the reference locations (background), since no robust background data sets are available for surface water and sediment.

USEPA Reply: There are only two sediment reference locations that have been agreed to – one north of the Site (SDBK-001) applicable as reference for East Ditch and one (SDBK-004) applicable for MMBW. There are no reference locations appropriate for comparison to the other surface water bodies. Sediment should be compared to some standard (soil RSLs?) other than reference locations for discussion in Section 4.0.

Olin Response to USEPA Reply: *Since there are no national or state criteria for sediment comparison, analytical data for sediment samples from OU1 and OU2 will be compared to reference locations SDBK-001 for the East Ditch and SDBK-004 for MMBW. For chemicals of interest that USEPA has noted in comments, Olin will provide additional discussion of groundwater migration pathways to aid clarifying which compounds may represent potential contaminant impacts and which may represent natural or anthropogenic conditions.*

Comment No. 20: In previous meetings, Olin had agreed to provide chemical data for soils returned to excavations within the current containment area. These results were not identified in Section 4.0. Please include in Section 4.0 of the RI, both the data provided with the November 2012 Supplemental Work Plan, as well as data collected as part of post excavation confirmatory samples for materials placed within the containment area, which may not have known location coordinates.

Response No. 20: Olin and USEPA continue to discuss the means by which soils within the containment area will be handled under the RI. This comment will be more fully addressed once these discussions are completed.

USEPA Reply: As recently agreed to between EPA and Olin, an evaluation of the containment area will now be included in the OU1/OU2 RI report. The evaluation is based on the following:

a. There is no presumptive remedy for a cap over the containment area.

b. The deed restriction in place for the containment area has no bearing on the CERCLA process.

c. Since a. and b. are now out, and the containment area must go through the CERCLA process, Olin will be tabulating all of the known historical samples from within the containment area (with and without coordinates – mainly from the removal actions done) and creating exposure risk scenarios for the risk assessors to review/agree with. Samples without coordinates will be included in the 1 to 10 “accessible” category.

d. The release of DAPL within the area from the containment area will be part of the OU3 review.

e. In addition to the risk discussions, containment area samples must be looked at from the N&E perspective.

Based on the data tabulated under “c” above, Olin has agreed to provide a “focused risk assessment” for the soils in the cap area. This information will be consistent with the approaches in the HHRA Interim Deliverables #1 and #2. Once EPA and the stakeholders have reviewed the information, and approved the approach/outcome, it will become part of the OU1/OU2 RI Report in the HHRA.

Olin Response to USEPA Reply: *Even though the existing Deed Restriction does not necessarily remove the containment area from the CERCLA process, it is in*

fact a legally binding document that does have impact on future use of the site. That being said, chemical data for soils within the Containment Area will be included in the draft OU1/OU2 RI nature and extent evaluation and a hypothetical future construction worker and hypothetical future industrial worker soil exposure scenario (surface and shallow subsurface) will be included in the human health risk assessment. A draft of this risk evaluation has been forwarded to USEPA for their review and does not show risk above USEPA risk Guidelines. Based on discussions with USEPA, a permanent cap will be included as a component of each remedial alternative evaluated in the OU1/OU2 Feasibility Study. Installation of a permanent cap is a continuation of the actions begun under the MCP and is a conservative approach given that the soils within the containment area do not pose any unacceptable risk to human health or the environment.

Comment No. 21: An evaluation of the nature and extent of soil contamination in the containment area is needed within Section 4.0. In order to conduct this evaluation, analytical results for the containment area must be included separately from the general description of the overall site soil results. Further, if the final location of the sample result in the containment area is unknown, assume that the sample is within the 1-10 ft depth range. Note that samples in the containment area may or may not be the result of previously regulated activities such as RCRA or TSCA and an understanding of the movement of the historical wastes generated, handled, and possibly disposed of at the site is important. This ties into Comment 99 regarding sewer systems.

Beginning on page 2-5 of the draft RI, Olin provided a summary of soils that were disposed of, including a table showing which ones were disposed of on-site. See pages 2-5 through 2-6. However, this material does not include any specific chemical discussion of RCRA wastes (listed/characteristic that were indicated on the submitted Part A (August 8, 1980, August 18, 1980, and November 18, 1980 as Stepan Chemical) and the amended Part A (April 30, 1984 and June 29, 1992 as Olin Chemical). Although the most recent regulatory interaction was with the MassDEP under the MCP, the site did handle listed and characteristic waste as identified under RCRA. As such, the movement of these wastes from the onsite tanks/containers to the onsite distribution systems to Lake Poly and the identified treatment systems and ultimately to the containment area must also include a discussion of the movement of the RCRA materials.

This RCRA / TSCA information will be needed for the Applicable or Relevant and Appropriate Requirements (ARAR) determination.

Response No. 21: Olin and USEPA continue to discuss the means by which soils within the containment area will be handled under the RI. This comment will be more fully addressed once these discussions are completed.

USEPA Reply: Further EPA and Olin discussion needed.

Olin Response to USEPA Reply: *Please see Olin's response to Comment 20 above.*

Comment No. 25: Olin previously agreed to revisit the toxicity assessment that was used to determine N-nitrosodimethylamine (NDMA) benchmarks. Has this been done, and if so, should the current benchmarks be adjusted?

Response No. 25: A comprehensive literature review was conducted and original published articles and other sources of information have been requested and obtained. Review of the articles and other sources of information are on-going. Upon completion of the review, recommendations will be made concerning updates to the selected benchmarks.

USEPA Reply: Completion of this review is critical; changes to the NDMA benchmarks will have a significant impact on the text, tables and figures of both the RI and the risk assessments. Please complete the review and make any changes before submitting Interim Deliverable #3 for the HHRA and ERA.

Olin Response to USEPA Reply: *Review of the information to date has not identified any changes to NDMA benchmarks. Olin will continue to keep abreast of newly published literature and any identified updates to the selected benchmarks will be evaluated and incorporated into the HHRA and BERA.*

Comment No. 26: Section 4.0 should discuss all detections above screening criteria, not just the ones considered to be related to known site operations. In several subsections, such as the discussion of surface water, only site-related parameters are described. Other analytes are often present at elevated concentrations or high frequencies and should be mentioned.

Response No. 26: Surface water and sediment do not have applicable screening criteria. The data can be compared to reference sample results. For those compounds detected above reference values but which are not considered to be Site-related, they will be acknowledged with a statement that they are not considered Site-related. It is also common that substances or elements that occur naturally are often detected at a high frequency and their detection should not be construed with being Site-related.

USEPA Reply: All detections above screening levels should be discussed. Details should be provided indicating why some contaminants are not Site-related, as appropriate. See HHRA Interim Deliverable #2, Comment No. 1. The screening levels for surface water and sediment should be addressed as stated in Comment 18.

Olin Response to USEPA Reply: *Olin will acknowledge the presence of constituents that have elevated concentrations, are detected frequently, or are above screening levels and will identify if the constituents are believed to be naturally occurring or if they are considered to be contributed from other anthropogenic sources. In situations where Olin believes specific chemicals of interest are not related to releases from the Olin Site, we will provide rationale. Where applicable, Olin will discuss data relative to: Soil (background on-site locations and Industrial RSL); Surface Water (background/reference locations and AWQC); Sediment (background/reference locations). There are no national or state screening levels for sediment.*

Comment No. 27: Section 4.0 should include a conclusion section listing the analytes that exceed screening criteria (whether Olin considers them to be site-related or not). This section may eliminate certain analytes after the initial summary. Section 5.0 should reference this summary section and discuss each chemical or chemical group. An initial group of contaminants that are commonly detected and exceed screening criteria in soils include TMPs, BEHP, NDPA, several PAHs, C5-C8 aliphatics, hydrazine, Aroclor-1260, arsenic, and hexavalent chromium. A similar comparison should be performed for sediment and surface water.

Response No. 27: A summary section will be prepared as requested. If Olin believes an analyte is not Site-related it will acknowledge that the compound is present above a screening level and it will state the compound is not-Site related. For infrequently detected analytes, it will also indicate whether the analyte is an important contributor to risk or not.

USEPA Reply: There is currently no mutually agreed upon list of "Site-related" contaminants. See HHRA Interim Deliverable #2, Comment No. 1.

Olin Response to USEPA Reply: *Olin has agreed to identify chemicals of interest for the Site as those compounds that were used, manufactured, or released (raw materials, products, and constituents associated with waste streams and spills). Please also see response to Comment 60. Certain SVOCs, metals, and inorganics also occur naturally or are common anthropogenic contaminants. In circumstances where detected chemicals of interest are naturally occurring or believed to be from anthropogenic sources, Olin will make provide rationale in support of such conclusions.*

Section 5.0

Comment No. 29: Section 5.1 should include a discussion of all chemicals that exceed screening criteria and have not been ruled out in Section 4.0. For example, several PAHs and NDPA exceeded site-specific background as well as industrial RSLs and should be discussed.

Response No. 29: The fate and transport section will focus on chemical that are Site-related and important relative to risk. Other chemicals will be discussed but the degree of emphasis and detail will commensurate with their importance to the Site.

USEPA Reply: There is currently no mutually agreed upon list of "Site-related" contaminants. See HHRA Interim Deliverable #2, Comment No. 1.

Olin Response to USEPA Reply: *Please see response to Comment 27 above.*

Comment No. 30: Page 5-4, Section 5.2: Leaching is dismissed as a migration pathway in the second paragraph of the section. This is contradicted by the discussion of leaching of TMPs (and other compounds, as discussed in the comments on Appendix J) in the second bullet on

page 5-7. Please add a separate subsection, such as 5.2.3, to address locations where leaching may occur.

Response No. 30: Leaching is typically considered to be a vadose zone process where a leachate is generated that then migrates vertically to the water table. A separate discussion will be added to discuss the solubilization of TMPs and related compounds that occur associated with former LNAPL smear zones related to releases from Plant B Production Area and Tank Farm.

USEPA Reply: Appendix J needs to be revised as discussed in the Appendix J comments, and conclusions need to be added to this leachability section in addition to the TMP discussion.

Olin Response to USEPA Reply: *Appendix J will be revised to address Appendix J specific comments. Conclusions from Appendix J regarding leachability will be added to Section 5.2 and the TMP discussion as requested.*

Appendix J

Comment No. 36: Comparisons of soil data to Soil Screening Levels (SSLs) have been performed, as presented in the Tables 4.1-1 through 4.1-3 and Appendix F. Appendix J text needs to discuss the results of these comparisons. This discussion should provide a list of soil analytes that may be a continued source of potential contamination to groundwater. The focus of the OU1/OU2 RI is based on risk from direct contact with soil. Risk from leaching to groundwater is separate and may be from a different set of analytes. The results of the comparisons to SSLs should be the basis for the leaching discussion in Appendix J.

Response No. 36: The SSLs provide an overly conservative estimate of leaching potential that would predict impacts to groundwater from essentially every compound detected. Olin did perform the assessment USEPA requested which was to include a tabulation of the SSL values that were exceeded, and acknowledge that SSLs are exceeded, but then rely on a visual and spatial comparison of soil concentrations to shallow groundwater data to identify a correlation between soil and groundwater. This was accomplished and there was no obvious areas where leaching to groundwater are an issue. The TMPs and related chemicals associated with water table LNAPL smear zones are an entirely different issue Olin will be discussing separately.

USEPA Reply: The part of the evaluation that was not performed was a critical **evaluation** of the compounds that did exceed SSLs. Appendix J appears to have ignored the SSL comparison and evaluates only the same compounds that were a concern for direct contact risk. To have a complete evaluation of the compounds that exceeded the SSLs, all compounds need to be included even if they did not exceed (to indicate that they were evaluated and not forgotten).

Olin Response to USEPA Reply: *Olin will provide what we believe to be a "critical **evaluation."** This critical **evaluation** will more or less be a statement that*

every constituent, even those that are present at concentrations at or below background, are typically present at concentrations in excess of the extremely conservative SSLs. Based on the significant work we have completed regarding leachability during this investigation, it is quite clear that there are no constituents of interest that are present at concentrations that pose an on-going source of contamination to groundwater in such a way as to pose an unacceptable risk in groundwater. This information has been presented to USEPA and USEPA has indicated that they do not believe leaching to groundwater is an issue at this site. Having said this, chemicals within unsaturated soils with concentrations above SSLs will be identified in Tables 4.1-1 through 4.1-3. The uncertainties associated with the comparison of soil data to the SSLs will be discussed in Appendix J. The focus of Appendix J will continue to be the comparison of actual soil analytical data and shallow groundwater analytical data that is Appended. Appendix J will be revised to include the Plant B LNAPL and TMP smear zones area as requested. This additional discussion will be provided in Section 4 of the draft OU1/OU2 RI.

Comment No. 37: The text in Appendix J still does not address the interaction of deep soil (greater than 10 feet) and groundwater. Figures 1-10 and 1-11 should compare groundwater to deep subsurface soil (greater than 10 feet) instead of only to shallow subsurface soil.

Response No. 37: Deep soil below the water table is not an OU1 soil leaching issue. It is an OU3 issue since soil and groundwater below the water table are in equilibrium and deep groundwater is impacted from dense fluids that migrated through the water table vertically to deeper saturated soil.

USEPA Reply: Please present evidence showing soil and groundwater below the water table are in equilibrium as horizontal groundwater migration may deposit or pick up contamination from the soil. It should be noted that not all deep soil samples are below the water table; therefore, those above the water table should be evaluated as part of the OU1/OU2 RI.

Olin Response to USEPA Reply: *The leaching evaluation will only be completed for soils above the water table (regardless of depth) based on the technical information provided below. We believe that it is abundantly evident what is meant by soil and groundwater being in equilibrium. Continued presentation of evidence and discussion, as previously completed, to support this is nonsensical. USEPA clearly agrees that soils below the water table will not be described in the OU1/OU2 RI process according to statements made in many meetings as well as herein.*

The idea here is simple while the chemical/physical processes involved are somewhat more complex. The idea is based on the fact that there will not be a significant source of impacts that are solely associated with the saturated soil matrix and not associated with the surrounding groundwater. Likewise, there is not likely to be a significant source of contamination solely associated with groundwater that is not also associated with the surrounding saturated soil matrix. This is not true of

unsaturated soils (or soils above the water table). It is possible for there to exist sources of contamination in unsaturated soils that have not impacted groundwater, or that can potentially contribute to on-going groundwater contamination. This is why we are evaluating potential leaching concerns with unsaturated soil at the Site.

As the idea of soil/groundwater partitioning is simple. The processes involved with this partitioning of constituents between groundwater and soil matrices are more complex than simply "picking up and depositing contamination from soil along a horizontal migration pathway". In any event, the kinetics of such mechanisms are generally considered to be fast compared to the long time frames that transpire after contaminant releases from any given Site have occurred. These processes are integral to the rate of advancement of groundwater plumes and the rate of dissipation of the plumes once they have developed and as sources decay.

By definition, these processes are in equilibrium whether they are partitioning contaminants to soil or removing them since the direction of the transfer is controlled by solubility, concentration and the distribution coefficient that controls the amount of mass that can be sorbed; which in turn controls pore water concentrations in the immobile water fraction.

Olin will review the data contained in Appendix J to ensure that all unsaturated soils (regardless of depth) have been considered in the leachability evaluation.

SPECIFIC COMMENTS:

The following specific comments are arranged by section.

Executive Summary:

Comment No. 45: Page ES-3. Please specify that On-Property soils located within the water table will be evaluated under OU3.

Response No. 45: A statement will be included that specifies that On-Property soils located within the water table will be evaluated under OU3.

USEPA Reply: It should be noted that not all deep soil samples are below the water table, and therefore those that are above the water table need to be evaluated as part of the OU1/OU2 RI.

Olin Response to USEPA Reply: *The analytical data associated with unsaturated soil samples will be evaluated in the draft OU1/OU2 RI. The data associated with saturated soil samples will be evaluated as part of OU3.*

Comment No. 60: Page ES-11. Define COI. Not on list of abbreviations. How were the bolded contaminants identified? What is the process of this identification? Specify and direct the reader to the text.

Response No. 60: Chemicals of Interest. The text states" Chemicals with maximum concentrations that are greater than corresponding USEPA RSLs (triggering comparison to background and/or evaluation of risks) include (Site primary COIs are bolded):" The bolded chemicals have maximum concentrations greater than industrial RSLs.

USEPA Reply: Please elaborate on what is a Contaminant of Interest (COI). How is this defined/selected and what does it mean to be greater than the RSLs? How will this information be used in the Site decision-making process? As this is an important issue to both EPA and its stakeholders, further explanation on the RSL/ISL and how these COIs will be handled is important. Although not considered in this question previously, we have not yet agreed to a list of what is "site-related" and this will figure into any response. See HHRA Interim Deliverable #2, Comment No. 1. Although not stated above, it is assumed that COI will also be added to the list of abbreviations. The text should be revised and clarified further.

Olin Response to USEPA Reply: *On page ES-11, the term "chemicals of interest" is introduced and the associated acronym COI is also introduced. This term was used to identify those chemicals that have been associated with the former facility (as a raw material, product, or a constituent of waste streams or accidental releases) and that have been released to one or more environmental media. The COIs are "of interest" for the RI, because the RI is intended to define the nature and extent of contamination and to determine if the contamination poses risks to public health or the environment that require remedial action per the requirements of CERCLA. The RI should focus on COIs in order to meet those objectives. The term "chemical of interest" is intended to identify those chemicals that should be investigated in the RI because they were associated with activities at the property, were released to the environment, and therefore have some potential to contribute to human health or ecological risk. The term COI should be considered a descriptor that indicates a chemical is a* ***potential*** *risk contributor. The term COI does not indicate that a chemical poses a risks or requires action. That determination is made during the risk assessments.*

The original comment requests that the term "COI" as it appears on page ES-11 be defined and it requests information about the process of identifying those chemicals. It should be noted that the term "chemicals of interest" and the acronym "COI" are first introduced on page ES-4, where the primary chemicals of interest were identified. Page ES-11 discussed which chemicals detected above Industrial RSLS were COIs and identified the chemicals for which Industrial RSLs were not available. The text from page ES-4 is shown below.

> *Constituents in liquid waste streams and unintentional releases included chromium, bis(2-ethylhexyl)phthalate, N-Nitrosodiphenylamine, N-nitrosodipropylamine, diisobutylene (mixture of 2,4,4,-trimethyl-1-pentene and 2,4,4,-trimethyl-2-pentene), formaldehyde, dimethylformamide, Opex, and Kempore, sulfuric acid, hydrochloric acid, and numerous salts of sodium and ammonium (sulfates, chlorides, nitrates, and nitrites). Calcium sulfate (gypsum)*

was produced and precipitated when wastewaters were neutralized with lime (calcium hydroxide) – after the use of sodium dichromate had been discontinued. Polychlorinated biphenyls (PCBs) were used in electrical transformers at OU1 and some release to soil has been documented. Processing oil was released to soil and the subsurface in the area of the Plant B Tank Farm. Based on that information, the chemicals identified in the preceding sentences are considered primary chemicals of interest (COIs) for the Site.

The primary COIs were identified based on the site history and the results of several investigation efforts that were conducted to identify nature and extent of contamination. The "primary COIs" reflect history but also presence/absence/ concentrations in environmental media. The "primary COIs" list is not intended to represent all chemicals used or released at the site. Other chemicals associated with activities at the site have been reported in environmental media at low concentrations and low frequency of detection – those have not been included in the list of "primary COIs".

The term "site-related" has important connotations and denotations.

- *On one level, it might be said that because a chemical was used at the site, that chemical is "site-related". On this general level, COIs could be considered "site-related" chemicals. This level of designation of "site-related" is not the best level of designation for determining nature and extent of contamination of for evaluating site risks.*

- *On another important level (important to determining if there has been a release and to delineating nature and extent of contamination and in evaluating risks), it might be said that if the concentrations of sodium in soil samples from an area are above corresponding background levels, the concentrations of sodium in soils at that area are "site-related". It should be noted that if sodium concentrations in soil samples in an area are consistent with background concentrations, then neither the presence of sodium in soil nor the concentrations of sodium in that area would be considered "site-related".* ***In other words, the detection of a COI (particularly naturally-occurring (e.g., metals and inorganics) and anthropogenic "background" constituents (e.g. PAHs)) in an environmental sample, by itself, does not necessarily mean that the detection or the concentration is "site-related".***

- *Conversely, the detection of certain chemicals (not naturally occurring, not typical of anthropogenic background, included on the list of COIs, and does not have local known sources other than the site) in an environmental sample, could by itself, suggest that there has been a site-related release of the chemical. NDMA is an example of such a "site signature" chemical.*

While the term "site-related" is an important one for decision-making, determining if presence and/or concentrations of chemicals in environmental media should not be based solely on a list of chemicals that have been associated with site history and activities. Having a list of "chemicals of interest" for the site and having a shorter list of "signature chemicals" is useful in making decisions about site-related releases. Olin will proposed a list of "chemicals of interest" and "signature chemicals"

The RSLs have two roles in the RI – assisting in the horizontal and vertical delineation of releases and screening to determine what chemicals are associated with negligible risk and therefore need not be evaluated further in the human health risk assessment.

The soil RSLs represent concentrations below which human health risks for direct contact exposures are negligible. The RSLs are therefore very useful in eliminating chemicals from further evaluation because the associated risks are very low. ***An important note, the converse is not true: the RSLs are not to be used to determine if there is a risk that requires remediation.*** *Also, comparison to an RSL of a single concentration from a single soil sample cannot be used to determine if there is a site risk that requires remediation.*

For RSLs that are based on cancer risk, the RSL is associated with a cancer risk of 1 x 10^{-6} (one in one million). Typically, under CERCLA, the cancer risk that would trigger the need for remediation is a risk greater than 1 x 10^{-4} (one in ten thousand). That cancer risk level is 100 times higher than the cancer risk associated with the RSL. Consequently, concentrations that are above the RSL but less than 100 times the RSL may contribute cancer risk, but that cancer risk would not be sufficiently high to require remediation. For RSLs based on non-cancer risk, the RSL is associated with a hazard quotient of one (a level of exposure considered safe, even for sensitive individuals). In this instance, concentrations below the RSL are considered to be without substantial non-cancer risk. A concentration above the non-cancer risk-based soil RSL would indicate a potential for non-cancer hazard. If a representative soil concentration for an exposure area was above the non-cancer risk-based RSL and exposure was occurring, that would suggest that remediation may be required (to be confirmed by a risk assessment). Human health risk assessments typically use RSLs adjusted to a hazard index of 0.1 (instead of 1.0) to screen chemical concentrations and to select chemicals to be included in the risk assessment calculations.

The COI definition will be added to the list of abbreviations and text will be clarified as necessary. Compounds exceeding RSLs will be acknowledged in the draft OU1/OU2 RI.

Comment No. 64: Pages ES-12 through ES-14. Please reference the tables that identity the background samples (Tables 2.4-1 2.4-2, and 2.5-1 through 2.5-3) in the background discussion sections. These tables should be limited to the final background datasets.

Response No. 64: The data tables will be modified to include only those data sets USEPA and Olin agree are applicable as reference locations for specific streams.

USEPA Reply: Based on review of the HHRA Interim Deliverable #2, Olin continues to use one of the sediment/surface water locations (SDBK-002) that EPA does not approve.

Olin Response to USEPA Reply: *This will be corrected in the HHRA as well as the RI.*

Comment No. 66: Page ES-15. North Pond sample data should be included in the RI report as it will be available before the report is finalized.

Response No. 66: The North Pond data will be presented in a separate stand-alone report that will eventually be added to the RI as an appendix.

USEPA Reply: North Pond and the data associated with it should be included in the body of the OU1/OU2 RI text, figures, and tables.

Olin Response to USEPA Reply: *The North Pond Investigation Memorandum, which has been provided to USEPA, will be included as an Appendix in the RI and summarized in the Nature and Extent (Section 4) of the draft OU1/OU2 RI. Tables and figures will be referenced in the body of the RI as well.*

Section 1.0

Comment No. 77: Page 1-4. Section 1.3. Please include a stand-alone section upfront that discusses the Site/Property itself (not just all the features). Section 1.3 has separate sub-sections for various site areas, i.e. Plant B, containment area, ditch system, etc. There should be a separate description of the former manufacturing area, the undeveloped area east of the containment area (partly wetland), and the land around West Ditch Wetland. Note Section 1.4 site history explains various uses within the manufacturing area - warehouses, Plant A vs. Plant C vs. Plant D etc. Some words from this section along with words at the start of Section 1.3 could be moved into a subsection on the former manufacturing area.

Response No. 77: A brief summary section will be provided that does not make section 1.4 repetitive. The area called the Central Wetland will be introduced. The on- and off-Property West ditch are discussed.

USEPA Reply: The West Ditch is discussed in the draft OU1/OU2 RI; however, the soil exposure area identified in the HHRA as EA2 is not discussed in Section 1.3. Please apply the “Central Wetland” terminology to the HHRA as well as the RI.

Olin Response to USEPA Reply: *As requested, the HHRA and draft OU1/OU2 RI will include this terminology for “Central Wetland.”*

Comment No. 79: Page 1-6. Section 1.3.2. Please reword the discussion about the capture area for the slurry wall/cap containment area as the slurry wall/cap does not "fully contain" the on-property DAPL as the monitoring wells located outside the slurry wall/cap display. Suggested to modification of "The slurry wall fully contains the on-property DAPL and overlying groundwater located within the containment structure." with the following: "The slurry wall was designed and built to form a perimeter barrier around a discrete area of the Site where DAPL and DAPL-impacted overlying groundwater had been identified. As stated above, this source control action was intended to contain DAPL and to eliminate to the extent feasible (not fully contain) overlying groundwater. The effectiveness and degree of containment provided by this structure is undergoing evaluation through hydraulic pulse interference testing and will also be evaluated as part of OU3".

Response No. 79: The comment mischaracterizes the statements in the report. The report states" The intent of this source control action was to eliminate, to the extent feasible, the on-Property DAPL source material as a source of dissolved constituents to groundwater." Therefore the slurry wall contains the Diffuse Layer over the DAPL which represents the resultant dissolved contaminants whose source is the DAPL. The report does not state the Slurry Wall fully contains the DAPL.

USEPA Reply: Delete the sentence on Page 1-6. Section 1.3.2: "The slurry wall fully contains the on-Property DAPL and overlying groundwater located within the containment structure."

Olin Response to USEPA Reply: *The sentence will be deleted as it does not change the meaning or context of this section. However, the fact is that the slurry wall does fully contain the on-Property DAPL and overlying groundwater located within the containment structure. This sentence does not say (and certainly was not intended to say) that the slurry wall contains all on-Property DAPL and diffuse groundwater period.*

Comment No. 84: Page 1-6. Section 1.3.3 discusses the Ephemeral Drainage, which flows into Lower South Ditch - have any samples been collected in this area? If so, should this data be included in RI/ HHRA/ ERA? This area is in close proximity to samples used as background soils, is there potential to use sediment/surface water samples in this area for background sediment/surface water?

Response No. 84: Seven sediment samples were collected in Jan 2000 in this general area (RSD-09 through RSD-15). The samples collected from locations RSD-11 through RSD-15 were collected from the soil background area. The samples collected from locations RSD-09 and RSD-10 were collected just east of the soil background area. The only organics detected in any of the samples were TMPs (low concentrations only in RSD-09), acetone, and BEHP (only in RSD-10). There were no Site-related organics detected in any of the RSD samples collected from the soil background area. Metal and inorganic concentrations in samples collected from samples RSD-11 through RSD-15 do not indicate evidence of any Site-related impacts. Therefore, these sediment samples are considered representative of an area where no manufacturing activities are known to have occurred and

where impacts did not occur. The current background dataset that has been agreed upon with USEPA is adequate.

USEPA Reply: At the request of EPA, Olin has provided the data for these samples in an email (June 10, 2013). Based on EPA review of the information provided, EPA requested that Olin include samples RSD-09 and RSD-10 as surface soil samples in the nature and extent, HHRA, and ERA evaluations of EA 4 with the explanation that these "sediment" samples are "wetland soils." Although these two samples were collected as "sediment" in 2000, they are more likely representative of wetland soil (Olin concurred with that statement). There are no other soil samples collected at these locations included in the EA4 surface soil dataset. TMPs were detected in one of these two samples and BEHP in the other. Olin should include these samples in the EA4 soil dataset; consistent with the Site-wide inclusion of older soil data that remains representative of current conditions (has not been removed from the Site). Because of low concentrations of detected metals and organics, EPA concurs that samples RSD-11 through RSD-15 do not represent an impacted area. Because of the age of the data and the physical contrast between the ephemeral drainage area and other OU1 and OU2 surface water bodies, EPA concurs that the samples collected from RSD-11 through RSD-15 are not appropriate for use as sediment background samples. See HHRA Interim Deliverable #2, Comment No. 1.

Olin Response to USEPA Reply: *The data associated with samples RSD-09 and RSD-10 will be added to the surface soil data set for EA4 and will be included in the risk assessments for EA4.*

Comment No. 91: Page 1-9. Section 1.3.8. The DAPL description needs to include the backup on how DAPL is defined. The description is very specific on concentrations and is assumed to be based on specific groundwater data. As the OU1/OU2 report will "describe in general terms the nature of surface water interaction with impacted groundwater to the extent that such interaction has resulted in impacts to surface water" then this description is important to clarify in OU1/OU2 RI and not wait until OU3 RI.

Response No. 91: The definition of DAPL and the Diffuse Layer has been reviewed with USEPA on several occasions. References to definitions will be provided.

USEPA Reply: Definitions need to be included in the OU1/OU2 (and OU3) RI document (s). The reader should not be forced to acquire and review additional documents in order to understand DAPL and the Diffuse Layer.

Olin Response to USEPA Reply: *DAPL and Diffuse Layer are and were defined in Section 1.3.8 paragraph 3 of the draft OU1/OU2 RI. This definition will be augmented with the threshold values of major constituents that were used in the empirical equation to estimate DAPL density.*

Comment No. 94: Page 1-11. Section 1.4.2.1. What is HEXA? Please define.

Response No. 94: HEXA was a shortened name for hexamine.

USEPA Reply: The definition for HEXA should be added to the text or spelled out as hexamine in the text.

Olin Response to USEPA Reply: *HEXA will be defined in Section 1.4.2.1 of the draft OU1/OU2 RI as requested.*

Comment No. 95: Page 1-11. Section 1.4.2.1. It should be noted that Nitropore OT and Nitropore 5T were included in the preliminary RI analyte list, but were eliminated because of a lack of toxicity information and EPA analytical methods. Has any new information become available that would suggest re-visiting this decision? Please include in uncertainty discussion.

Response No. 95: No new information has become available. There is no toxicity information or chemical analytical data that would allow either compound to be addressed in the uncertainty discussion.

USEPA Reply: The uncertainty discussion (in the HHRA) should acknowledge potential contaminants, such as Nitropore OT and Nitropore 5T, which were used or produced at the Site but not analyzed for in Site media because of a lack of EPA analytical methods or toxicity information.

Olin Response to USEPA Reply: *This information will be added to the HHRA uncertainty discussion.*

Comment No. 96: Page 1-13. Section 1.4.2.2. Complete the PCB discussion with the inclusion of the most recent sampling results and the intended removal of the contaminated soil.

Response No. 96: As mentioned in prior comments Olin will keep EPA apprised of the results of the PCB sampling and if it decides to conduct a voluntary removal action.

USEPA Reply: Data from the PCB sampling should be added to the OU1/OU2 RI regardless of any future cleanup actions. Evaluation of PCB data within EA1 under the HHRA and under nature and extent in the OU1/OU2 RI should be included.

Olin Response to USEPA Reply: *Appropriate PCB data will be included in Nature and Extent (Section 4) of the draft OU1/OU2 RI and evaluated as appropriate in the HHRA.*

Comment No. 100: Page 1-17. Section 1.4.2.5. This section discusses a 150,000 water tank that is not included on Figure 1.3-2 that identifies on site tanks.

Response No. 100: The large tank is Tank 7 that is still used for storage in the Plant B system.

USEPA Reply: Please revise and include this tank on appropriate figure and within the text.

Olin Response to USEPA Reply: *The tank will be included and identified as requested.*

Comment No. 101: Page 1-18. Section 1.5, discussion of Section 4 states that discussion of vapor intrusion assessment for TMPs is included in Section 4; however, it is not. Brief discussion occurs in Section 5.2. Section 5.3 states that this pathway has been evaluated and is not currently a complete migration pathway. However, no VI assessment has been provided in the RI.

Response No. 101: The VI assessment is part of the second interim HHRA deliverable.

USEPA Reply: Please revise the OU1/OU2 (and later OU3) RI discussions based on this assessment.

Olin Response to USEPA Reply: *The VI evaluation will be discussed in greater detail in Fate and Transport (Section 5.3) of the draft OU1/OU2 RI with regards to pathway to receptors.*

Section 2.0:

Comment No. 107: Page 2-4. Section 2.1. Were sediments and soils removed from Central Pond disposed of off-site?

Response No. 107: Yes.

USEPA Reply: Please revise the text accordingly.

Olin Response to USEPA Reply: *Text in the draft OU1/OU2 RI will be revised accordingly.*

Comment No. 109: Page 2-4. Section 2.1. Where are RSO-6 and A8-CW-1? Please provide time frame for soil PAH hot spot removals here. Also Olin has stated at numerous meetings that PAHs are not a site-related contaminant. Does this removal action have implications for the discussions of PAH data adequacy?

Response No. 109: The removal actions were conducted in 2000 and were very small volumes and are discussed in Section 2.1.6.1.2.8 of Appendix A. These areas had been identified as hot spots because they met the definition of hotspot per the MCP. These removal actions do not have any implications concerning the adequacy of PAH characterization data. The A8CW-1 excavation was 10 feet wide, 10 feet long and 3 feet deep. The RSO-6 excavation was 12 feet wide, 14 feet long and 8 feet deep. Four confirmatory sidewall samples (A8CW-1-N, A8CW-1-E, A8CW-1-S, A8CW-1-W and RSO-06-N,RSO-06-E, RSO-06-S, RSO-06-W) and one bottom of excavation sample (A8CW-1-B

and RSO-06-B) were collected. The locations of the confirmation samples are shown on Figure 4.1-1. The figure is searchable using the find function in Adobe PDF to assist in locating the samples.

USEPA Reply: Please include a brief definition of a hotspot per the MCP. Further, provide clearer location information within the text of the OU1/OU2 RI to a specific section within Appendix A. Note that Appendix A was neither formally commented on nor modified since 2007 and there may be conflicting information to the OU1/OU2 RI. To avoid these conflicts, specific location within the FRI needs to be made so that it is clear to the reader what has transpired.

Olin Response to USEPA Reply: *The definition of a hotspot per the MCP will be included in the draft OU1/OU2 RI text and the reader will be directed to Appendix A - Section 2.1.6.1.2.8 of the FRI. There is no conflict between this information and the OU1/OU2 RI.*

Comment No. 111: Page 2-4. Section 2.1, EPH/VPH. Also Page 2-9. Discussions throughout the RI on the AS/SVE system are confusing. Based on review of the Semi-Annual Status Reports, it is apparent that there is still some portion of the AS/SVE system that continues to operate; yet the RI indicates that this system is closed. Some clarification in the various locations of the RI is needed to provide the correct status of the system.

Response No. 111: A majority of the system was removed based on MassDEP approval. The remainder of the AS/SVE system located immediately adjacent to Plant B Tank farm is not currently operating but the system components have not been removed per request of USEPA.

USEPA Reply: Please clarify the text accordingly.

Olin Response to USEPA Reply: *The text will be clarified as requested.*

Section 3.0:

Comment No. 115: Page 3-2. Section 3.2.1 appears to be based primarily on the 400-series borings. Borings from previous investigations should be used to supplement this information in locations where 400-series borings were not installed. For example, the FRI refers to boring logs from monitoring wells in the MMBW, which indicated that peat deposits could be up to 30 feet thick and could have implications for fate and transport in this area.

Response No. 115: Cross Sections of the MMBW were provided in the RI Work Plan.

USEPA Reply: Please include the cross sections, perhaps as an appendix, so the OU1/OU2 RI can be a stand-alone document and doesn't cause the reader to acquire and review additional documents. The focus of this comment is the use of new borings as a supplement to existing previous geological data. See Stakeholder Comment No.1 (GeoInsight).

Olin Response to USEPA Reply: *The cross-sections will be included as requested. New overburden borings were not installed along the alignment of these cross-sections.*

Comment No. 117: Pages 3-5 through 3-9. Section 3.3 should also include a discussion of the hydraulic conductivity and transmissivity of the shallow overburden groundwater. This is necessary to support Section 5.2's discussion of the migration pathways and expected fate of contaminants in surface water bodies.

Response No. 117: A reference to hydraulic conductivity data that was compiled for the groundwater model described in the FRI will be provided.

USEPA Reply: The hydraulic conductivity data should be included and discussed in the OU1/OU2 RI and not simply referenced.

Olin Response to USEPA Reply: *Hydraulic conductivity of the overburden aquifer will be discussed in Section 3.3 the draft OU1/OU2 RI. The table summarizing hydraulic conductivity test data from the groundwater model appendix in the FRI will be included and referenced in the text.*

Comment No. 118: Page 3-6, last paragraph. Groundwater gradients and the water levels used to calculate them should be provided either in a table or an appendix to support the discussion of vertical gradients.

Response No. 118: As mentioned previously, the synoptic water level data will be tabulated and provided. Horizontal gradients may be calculated from figures 3.3-1 and 3.3-2.

USEPA Reply: Calculations of horizontal gradients should be provided and not left up to the reader. Vertical gradients should also be determined and provided.

Olin Response to USEPA Reply: *Representative horizontal gradients for overburden groundwater will be calculated. The paired well data (shallow-deep) from the synoptic rounds will be used to calculate vertical gradients of the Site. These will be summarized in Section 3.3.*

Comment No. 119: Page 3-6, Section 3.3 refers the reader to the RI/FS Work Plan. Given the Work Plan consists of numerous documents, the definition of shallow and deep groundwater site wide (not just MMBW/MMBA – with the deep groundwater at 20 feet) needs to be clearly stated so that the terms "shallow" and "deep" groundwater are appropriate.

Response No. 119: The reader will be referred to the volume, section and page where the discussions were presented.

USEPA Reply: It is not acceptable to force the reader to locate and find such basic information in another document. A simple definition of "shallow" and "deep" groundwater in on-property areas should be added to the text of the OU1/OU2 RI.

Olin Response to USEPA Reply: *Shallow and Deep groundwater definitions and discussions that have been used to prepare groundwater contour figures will be provided as requested in Section 3.3.*

Comment No. 120: Page 3-7 through 3-9. Available surface water flow information should be added to the description of each applicable surface water body described in Section 3.3.1.1.

Response No. 120: Other than the flow measurements collected as part of the RI for the MMBW, only flows in the South Ditch have been quantified. These were summarized in the FRI and referenced in the RI report. That summary will be pulled forward and inserted into the South Ditch discussion.

USEPA Reply: Seasonal water flow variations and whether they are often dry have been noted in other surface water bodies in the OU1/OU2 RI. This type of qualitative information should be added if it is available for consistency.

Olin Response to USEPA Reply: *The only water body which has been observed to go dry seasonally is the middle reach of South Ditch and this will be clarified in the document. On-Property West Ditch and Ephemeral Drainage are ephemeral.*

Comment No. 121: Page 3-7. Section 3.3.1.1. North Pond is described as being under investigation for potential inclusion in OU2. As North Pond is a surface water body, it should be described in this section; although there is apparently no current surface water connection, please note the historical connection. Please include samples from here in Section 4.0 and describe the potential migration pathways in Section 5.0 as applicable.

Response No. 121: A separate report will be prepared for North Pond when all data is available and validated. If the North pond data indicates it should be included in the OU1/OU2 RI then adjustments to the document will be included at that time.

USEPA Reply: Regardless of what the North Pond data indicate, the evaluation should be included in the OU1/OU2 RI.

Olin Response to USEPA Reply: *The North Pond Investigation Memorandum, which has been provided to USEPA will be included as an Appendix and summarized in the Nature and Extent Section 4 of the draft OU1/OU2 RI with reference to appropriate tables and figures.*

Comment No. 122: Page 3-7. Section 3.3.1.1, Off-Property West Ditch. The text states that 20 of the 38 acres in this watershed are either impervious or standing water. The acreage which is impervious (e.g. pavement or buildings) should be specified on a figure, as this has

implications for surface water flow. Please clarify surface water flow direction site-wide, but in particular in this area relative to the wetland west of Jewel Drive.

Response No. 122: Location of buildings and roadways on the figures is adequate to indicate the general extent of impervious surfaces. An aerial photographic background was on figures since it tends to obscure text and investigation labels on figures that have a lot of data presented on them. This level of information is not required for an RI report. Paved surfaces and buildings are also readily available on Google Earth and other mapping programs. Arrows will be provided on figures depicting site features for surface water flow directions.

USEPA Reply: EPA disagrees that the amount of pervious vs. impervious surfaces is "too much detail" for an RI, given the fact that surface water and sediment are a major part of the RI report. Please indicate on a figure which areas are impervious.

Olin Response to USEPA Reply: *Site-wide surface water flow directions will be specified on a new Figure 3.3-3. An aerial photograph depicting pervious vs. impervious surfaces in vicinity of jewel Drive and the off-PWD will be added as Figure 3.3-4.*

Comment No. 123: Page 3-7. Section 3.3.1.1, On-Property West Ditch. The relationship between the Off-Property West Ditch (off-PWD), on-PWD, and South Ditch should be clarified. Is it possible for water to flow from the off-PWD into the on-PWD, or vice versa, or does the surface topography prevent this?

Response No. 123: Surface topography prevents a direct connection between the on-PWD and off-PWD. Both ditches flow into South Ditch.

USEPA Reply: Response accepted. Please revise the text as appropriate.

Olin Response to USEPA Reply: *The text will be revised as requested.*

Comment No. 125: Page 3-8, Section 3.3.1.1, Central Pond. The statement that the underlying aquifer is unconfined requires additional evaluation. Local stratigraphy (boring logs) and an evaluation of relative water levels between the pond and nearby shallow monitoring wells/piezometers should be used to support this. Also describe the size of the drainage area for this feature.

Response No. 125: The unconsolidated deposits in this portion of the property consist of fine to coarse sand and sand with gravel. Concurrent surface water elevation survey data and water level data do not exist. Based on topographic and water table elevation information contained in the RI report, the elevation of the bank or land surface around the pond is approximately 80 feet MSL and the groundwater elevation in the vicinity of the pond is around 78 feet MSL. The water in the pond is typically several feet below the land surface. The nearby wells are water table wells (screened across the water table) and the pond elevation and the water table elevation appear to be the same. There is no indication

geologically of silty material in the stratigraphy and the pond sediments were excavated to underlying soil (sandy unconsolidated deposits). Therefore by definition and supporting information, the underlying aquifer is unconfined. By inspection of topography in Figure 3.1-1, the drainage area for Central Pond is small and of very limited extent and does warrant calculation at this time.

USEPA Reply: It is assumed that the response should state that the drainage area does *not* warrant calculation. Please revise and include this write up in the OU1/OU2 RI.

Olin Response to USEPA Reply: *As requested, the text will be revised to state that the drainage area does "not" warrant calculation.*

Comment No. 127: Page 3-9. Section 3.3.1.1, Landfill Brook. The section notes that flocculent was noted through the reach of the brook included in the temperature survey. Which portion of the brook does this include?

Response No. 127: The entire section that fronts the Woburn Sanitary Landfill.

USEPA Reply: Response accepted. Please revise the text as appropriate

Olin Response to USEPA Reply: *The text will be revised as requested. In addition, at the request of EPA, this condition will also be noted in the evaluation of the Woburn Sanitary Landfill on water quality within Landfill Brook.*

<u>Section 4.0:</u>

Comment No. 129: Page 4-1. Section 4.1.1. This section titled "Sources" discusses previous remediation activities. Please merge this section into Section 2.1, with the following comments applied:

a. Section 4.1 of the Draft FRI should be referenced.

b. Please show both source areas remediated AND those potential source areas that were investigated on a figure, as well as DAPL pools.

c. Is the mentioned "waste water treatment plant" shown on a figure or described in the text. EPA would like information on the operations of this treatment plant. Is it the same as the "pretreatment plant" described briefly in section 1.4.2? Does this represent a possible source of NDMA?

d. Discussion of isolation and containment of DAPL has not been confirmed.

Response No. 129:

a. The reference will be added.

b. Historic sources, though remediated are germane to the nature and extent of contamination and the very brief summary will be retained in Section 4. Section 2 will be referenced as well for more detailed information.

c. The waste water treatment plant by east Warehouse was investigated with 4 soil borings none of which detected NDMA in soil and is not considered a potential source of NDMA. This facility was used to pre-treat water that went to the MDC sewer.

d. The statement in the text discusses the DAPL **area** (emphasis added) and that the intent was to "to eliminate, to the extent practical, migration of groundwater from within this **area** to surface water in the South Ditch". DAPL is a discrete aqueous phase and is not groundwater. Furthermore, DAPL is denser than water and cannot migrate to surface water.

USEPA Reply:

b) Please include potential source areas and DAPL pools on a figure.

d) The DAPL in this area presumably has a diffuse layer above it, which can certainly contaminate water. Just as with DNAPL, the DAPL presence is a potential source of continuing contamination to groundwater, which may move through this area. The emphasis on area does not negate the original comment

Olin Response to USEPA Reply: *Currently the known extent of DAPL pools will be provided as Figure 1.0-3 at an appropriate scale that allows depiction of the Containment Area, including the on-property and off-property portions of the Upper DAPL Pool and the Main Street DAPL Pool.*

Comment No. 131: Page 4-2. Section 4.1.2. Several analytes exceeded SSLs; the soil leaching comments (Comments 221-226) discuss soil leaching and SSLs.

Response No. 131: The leaching evaluation was conducted per agreement with USEPA. Please see Olin's response to comments 221-226.

USEPA Reply: Please refer to the specific responses for comments indicated in Olin's response and include this information in Section 4.1.2.

Olin Response to USEPA Reply: *Please see Comments 221 and 222 below and how they will be addressed. As requested, Comments 223-226 will be addressed as previously indicated. Groundwater distribution figures for the following analytes: Cr, Cr+6, TMPs, NDPA, and BEHP along with further general discussion of the SSLs will be provided in Section 4 of the draft OU1/OU2 RI. It should be noted that Olin pointed out and USEPA concurred that the overly conservative nature of the SSLs precludes their use for developing a useful, realistic assessment of actual expected impact in groundwater from vadose zone soil contamination. The only reasonable approach to answer this question, which Olin provided in Appendix J with USEAP agreement, is a comparison of frequently detected chemicals of interest and*

site groundwater. The SSLs will not be used to determine which groundwater distributions need to be developed.

Comment No. 133: *Page 4-3, Section 4.1.2.2 contains several inconsistencies between the text and Table 4.1-2.*

a. The third-most common SVOC detected was pyrene, according to the table. Diphenyl ether was detected in less than 10 samples.

b. Aroclor-1260 exceeded its industrial RSL in the table and was not mentioned in the text.

c. Alpha-chlordane and endosulfan sulfate also do not have industrial soil SSL criteria and should be added to the text.

Response No. 133:

a. The text also considered frequency of detection. It has been agreed to acknowledge compounds with low frequency of detection that exceeded industrial RSLs as well.

b. It has been agreed to acknowledge compounds with low frequency of detection that exceeded industrial RSLs as well. A separate discussion of the PCB area will be included and EPA will be updated as new data is received.

c. Alpha-chlordane and endosulfan sulfate do not have industrial RSLs. These two compounds will be added to the text.

USEPA Reply:

a) EPA agrees that compounds with a low frequency of detection exceeding RSLs should be mentioned in the text. However, the fact remains that pyrene is the third most common SVOC detected and should be listed as one of the SVOCs that was frequently detected, as its detection frequency was much higher than other SVOCs listed.

Olin Response to USEPA Reply: *Pyrene is a PAH and is a common anthropogenic contaminant. The draft OU1/OU2 RI will indicate it was detected frequently; however, it will be acknowledged appropriately as a common anthropogenic contaminant.*

Comment No. 140: Page 4-5. Section 4.1.2, Metals and Inorganics. The described area of hexavalent chromium exceedances of RSLs should be evaluated separately in the HHRA from the rest of EA1. This area also has highest levels of BEHP and NDPA within EA1. See comments on the HHRA Interim Deliverable #1.

Response No. 140: An area east of the former office building which has higher concentrations of TMPs will be separated from EA1 into a new exposure area (EA7). The remaining portion of EA1 will be evaluated as one exposure area.

USEPA Reply: In addition to separating off EA7, the described area of hexavalent chromium exceedances of RSLs should also be evaluated separately in the HHRA from the former manufacturing portions of EA1. See HHRA Interim Deliverable #2, Comment No. 3. This area (encompassing the former disposal areas) also has the highest levels of BEHP and NDPA within EA1. Olin needs to evaluate the former manufacturing and disposal areas separately or provide justification in the OU1/OU2 RI and HHRA for not dividing this area off as its own exposure area. During the June 25, 2013 meeting discussion, Olin offered to provide a technical memorandum to provide assurance that the treatment of EA1 as one large area did not make a significant difference to the results. The technical memorandum will become part of the HHRA uncertainty discussion and carried into the HHRA as an appendix. Please provide this memorandum for EPA approval prior to further evaluation of EA1.

Olin Response to USEPA Reply: *The referenced technical memorandum was recently submitted to USEPA. We have evaluated these areas separately and together in each way that USEPA has requested. The result of these evaluations continues to indicate that there is no unacceptable excess lifetime cancer risk regardless of how the areas are separated. The memorandum provides justification for not sub dividing this area into component exposure areas. This response and the memorandum itself will serve as technical backup for the assumptions made in the OU1/OU2 RI. The evaluation of these areas will be described briefly in the report.*

Comment No. 145: Page 4-6 to 4-7. Section 4.1.2.4 states perimeter concentrations are below RSLs or "published" background. There is site specific background, so why compare to published background?

Response No. 145:

USEPA Reply: This seems like a minor issue that just got missed in the response, but it is flagged here for follow-up.

Olin Response to USEPA Reply: *Background values for arsenic published by the MassDEP are useful and have also been used to place Site specific data in context. The use of this data (unbiased background data) adds to the conclusions that metals (arsenic) represent background conditions at the Site. This has been further supported by statistical analysis of the on-site arsenic distribution.*

Comment No. 146: Page 4-7. Section 4.1.3. No on-PWD surface water was collected during the RI investigations. Please confirm. If this is accurate, please provide some discussion of older surface water data from the On-PWD and an explanation of why no recent surface water samples were collected.

Response No. 146: The on-PWD is not a flowing ditch or stream and therefore SW samples were not collected and none were specified in the approved work plan or the work plan addendum.

USEPA Reply: If older surface water data exists, it should be discussed and the explanation above added to the text. If it does not exist, no correlation between sediment and surface water should be drawn in the OU1/OU2 RI for this area.

Olin Response to USEPA Reply: *Older surface water data does not exist. The collection of surface water samples was not required in the approved work plan or the work plan addendum.*

Comment No. 147: Page 4-7. Section 4.1.3.1. The first paragraph states that Table 4.1.4 compares the surface water results to maximum background concentrations, but it does not. Olin has acknowledged that there are no valid background locations for comparison to the on-site surface water and sediments. For MMBW, background concentrations from the SDBK-004 should be used. For East Ditch, background concentrations from the SDBK-001 should be used. Appropriate reference criteria should be used for comparison for both surface water and sediment. Section 4.0 and Tables 4.2-4 through 4.2-10 should compare surface water and sediment results to federal and state sediment/surface water screening benchmarks and to background where appropriate.

Response No. 147: It has been agreed to use those specific locations as reference samples for comparison. The human health and ecological risk assessments utilize surface water and sediment screening criteria to evaluate the surface water and sediment data.

USEPA Reply: The response to this comment did not address the request to compare surface water and sediment results to federal and state sediment/surface water screening benchmarks in the Section 4.0 text and tables. Olin's response to Comment No. 18 above indicates a willingness to provide comparison of surface water data to Ambient Water Quality Criteria in Section 4.0. EPA recommends comparing sediment data to recreational soil RSLs as a conservative measure for purposes of the nature and extent discussion.

Olin Response to USEPA Reply: *As mentioned previously, surfacewater discussions will reference AWQCs. There are no federal/state screening benchmarks for sediments. Therefore, sediment samples from OU1 and OU2 will be compared to reference locations SDBK-001 for the East Ditch and SDBK-004 for MMBW. Olin does not agree that comparing sediment data to recreational soil RSLs is appropriate. None of the surface water bodies evaluated in the RI Report have been identified as recreational areas. The use of recreational soil RSLs to evaluation delineation of nature and extent would not be appropriate. Evaluation of the significance of the data with respect to risk will be conducted in the Baseline Ecological Risk Assessment, and where appropriate, the Human Health Risk Assessment.*

Comment No. 149: Page 4-7, Section 4.1.3.1. The third paragraph of this section describes surface water in relation to nearby shallow groundwater samples. This discussion should either include a reference to specific figures depicting the groundwater concentrations discussed, or

should be expanded to describe the location of the monitoring wells in more details. Also, "diffuse characteristics" is vague. Add details or reference a figure that shows these.

Response No. 149: The definition of diffuse characteristics is not vague as the working definition of diffuse material; is that is has specific conductance ranging from 20,600 µS/cm to 3,000 µS/cm. A table will be provided that lists the detected analytes in groundwater.

USEPA Reply: Please ensure that the table in question also identifies the monitoring wells and the concentrations of all parameters which are commonly detected and above screening criteria. The term "diffuse characteristics" should be replaced with the specific definition noted in the response or provide a reference for this definition.

Olin Response to USEPA Reply: *The surface water tables will list the AWQCs as screening criteria and the report will discuss what constituent concentrations in surface water are above those criteria. There are no applicable "screening criteria" for groundwater results that are directly comparable to surface water. Evaluation of the significance of the surface water data will be conducted in the Baseline Ecological Risk Assessment.*

A summary table of analytes detected in groundwater collected from wells with characteristics of Diffuse material will be added to the RI. This will include data from for GW-202D, GW-202S, GW-202BR, GW-79S, GW-55S, and GW-55D which provide context for groundwater/ surface water interactions near South Ditch. In addition this table will include data from other shallow and deep groundwater wells that are germane to explaining the origin of specific constituents detected in South Ditch surface water. These wells include GW-202S, GW-10S/D, GW-208S/D and GW-78S. Groundwater from GW-79S is appropriate for surface water for Central Pond and the Detention Basin. Groundwater from GW-202S is also relevant to surface water in the adjacent Detention Basin. The term "diffuse characteristics" will be defined as described in the original response as requested.

Comment No. 152: Page 4-8, Section 4.1.3.2. The third sentence states that the analytes detected were found at concentrations lower than adjoining water bodies. This conflicts with the first sentence, which states that Central Pond has no surface water inlet or outlet. If the first sentence is true, then the third sentence should be revised to "…nearby water bodies". Also, it is not clear which water bodies and samples this sentence is referring to. The closest sample is PZ-16RR from the South Ditch. If this is the sample in question, then the statement is incorrect for calcium (SD-501 from the Central Pond is 190 mg/L as opposed to 57 and 72 mg/L at PZ-16RR).

Response No. 152: Central Pond has no outlet. The sentence will be revised to "adjacent water bodies". South Ditch is adjacent to Central Pond.

USEPA Reply: This part of the Response is accepted. In addition, as requested in the original comment, please clarify which samples the text is referring to.

Olin Response to USEPA Reply: *The text refers to sample locations shown in Figures 4.1-29 through 4.1-36 surface water. Concentrations within Central Pond are lower than corresponding concentrations at surface water location PZ-16RR with the exception of calcium. As requested, the text in Section 4.1.3.2 will be revised accordingly.*

Comment No. 154: Page 4-8, Section 4.1.3.2. Surface water samples from Central Pond were not analyzed for specialty compounds other than NDMA as agreed to by EPA. In light of the detections of hydrazine, formaldehyde, nonylphenol, and Kempore in the nearby South Ditch, please provide an explanation for not analyzing for these site-specific specialty compounds. Is nearby groundwater also impacted by these contaminants?

Response No. 154: Upper South Ditch is impacted by discharge of groundwater with dissolved phase concentrations consistent with Diffuse Layer material. The groundwater in vicinity of Central Pond is not.

USEPA Reply: Please provide details/support for the statement that groundwater in the vicinity of Central Pond is not impacted by discharge of groundwater with dissolved phase concentrations consistent with Diffuse Layer material. Surface water (1 sample) and sediment data (9 samples, but 7 of the 9 samples were only analyzed for aluminum, iron, and chromium) from Central Pond presented in the HHRA Interim Deliverable #2, Attachment 2, Tables 16 and 24, indicate some evidence of contamination, including detections of numerous metals and inorganics, including sulfate, in surface water and detections of TMPs and inorganics, including sulfate and hexavalent chromium, in sediment. Based on this review of the data, further surface water and sediment sampling is being warranted at this water body, including specialty compounds.

Olin Response to USEPA Reply: *As summarized in the draft OU1/OU2 RI, Central Pond was remediated by excavation and sediments were disposed off-site in 2000. Any impacts to surface water and sediment in Central Pond would be associated with the presence of shallow groundwater. Although the available surface water and sediment data (metals, inorganics, TMPs) indicate some impact associated with migration of shallow groundwater into Central Pond, the available groundwater analytical data for specialty compounds from the area around Central Pond (GW-79) indicate that specialty compound impacts to surface water and sediment are unlikely to be significant. Groundwater results from monitoring well (GW-79) adjacent to Central Pond, has been sampled and analyzed for specialty compounds three times. Results are tabulated below.*

Chemical	Units (ug/L)	GW-79S-DUP	GW-79S	GW-79S
Hydrazine	ug/L	0.2 U	0.2 U	0.2 UJ
Monomethylhydrazine (MMH)	ug/L	0.5 U	0.5 U	0.5 UJ
UDMH	ug/L	0.5 U	0.5 U	0.5 UJ
Acetaldehyde	ug/L	30 UJ	30 U	30 U
Formaldehyde	ug/L	30 UJ	30 U	30 U
Phthalic Acid/Phthalic anhydride	ug/L	10 U	10 U	10 U
4-(1,1,3,3-Tetramethylbutyl)phenol	ug/L	0.95 U	0.95 U	0.95 UJ
4-Nonylphenol (Tech.)	ug/L	3.8 J	3.2 J	6.1 J
Nonylphenol Diethoxylate	ug/L	19 U	19 U	19 UJ
Kempore (Azodicarbonamide)	ug/L	1000 UJ	1000 UJ	1000 UJ
OPEX	ug/L	100 UJ	100 UJ	100 U

Results indicate non-detectable concentrations for all specialty compounds with the exception of nonylphenol. Nonylphenol was the only detected specialty compound at concentrations ranging from 3.2 to 6.1 ug/L. These concentrations are lower than the AWQC of 6.6 ug/L and the REACH screening benchmark of 54 ug/L. Based on the groundwater data (adjacent to Central Pond), the collection of additional specialty compound data is not necessary for characterizing nature and extent or for characterizing risk. The available data for surface water and sediment, including metals, inorganics, VOCs, and SVOCs are adequate for the purposes of characterizing nature and extent and for conducting the risk assessments for Central Pond.

Comment No. 155: Page 4-8, Section 4.1.3.3. Surface water samples from the Stormwater Detention Basin were not analyzed for specialty compounds other than NDMA as agreed to by EPA. In light of the detections of hydrazine, formaldehyde, nonylphenol, and Kempore in the nearby South Ditch, please provide an explanation for not analyzing for these site-specific specialty compounds. Is nearby groundwater also impacted by these contaminants?

Response No. 155: The concentrations of detected analytes in the detention basin are low compared to Upper South Ditch and shallow groundwater underlying Upper South Ditch which is an active groundwater discharge area.

USEPA Reply: Please explain that the detention basin is not an active groundwater discharge area because of its relatively high elevation. This discussion should also be added to Section 3.0. Surface water (1 sample) and sediment data (2 samples) from the detention basin presented in the HHRA Interim Deliverable #2, Attachment 2, Tables 15 and 23, indicate some evidence of contamination, including detections of NDMA, N-nitroso-di-propylamine, and numerous metals including hexavalent chromium, in surface water and detections of TMPs, BEHP, NDPA, and metals in sediment. Based on this review of the data, further surface water and sediment sampling is warranted at this water body, including specialty compounds.

Olin Response to USEPA Reply: *We will explain that the detention basin is not an active groundwater discharge area as requested. However, additional surface water and sediment sampling is not warranted as per the following discussion.*

As summarized in the draft OU1/OU2 RI, the Detention Basin was created by blasting into bedrock prior to construction of the slurry wall. The northern side of the detention basin is a concrete wall that abuts the slurry wall. The drain for the surface water on the temporary cap discharges to the detention basin. The outlet structure maintains the surface water elevation at 80.32 feet MSL. During periods when surrounding groundwater elevations are greater than 80.32 feet MSL, groundwater may be discharging into the Detention Basin. Groundwater elevation data from wells GW-78S, PZ-24, PZ-25, GW-202S, and GW-202D indicate that such conditions do periodically exist. The bedrock ridge was blasted, was highly resistant and blasting may have contributed locally a blast fracture pattern in shallow bedrock. Otherwise the transmissivity of the bedrock is expected to be low, similar to GW-202BR.

The primary pathway of impact to surface water and sediment would be through shallow groundwater. As presented in the RI and HHRA, given the low concentrations of NDMA, ammonia and sulfate, there is evidence of minimal impact from groundwater on the surface water of the Detention Basin. Groundwater adjacent to the Detention Basin (GW-202S) has been sampled and analyzed for specialty compounds two times. Results are tabulated below.

Chemical	Units	GW-202S		GW-202S	
1,1-Dimethylhydrazine	ug/L	0.5	UJ	0.5	U
4-Nonylphenol	ug/L	38		29	
Acetaldehyde	ug/L	30	U	30	U
Formaldehyde	ug/L	30	U	30	U
Hydrazine	ug/L	0.2	UJ	0.2	U
Kempore (Azodicarbonamide)	ug/L	1000	U	1000	U
Methylhydrazine	ug/L	0.5	UJ	0.5	U
Nonylphenol Diethoxylate	ug/L	19	U	19	U
OPEX	ug/L	100	U	100	U
Phenol, 4-(1,1,3,3-Tetramethylbutyl)-	ug/L	0.95	U	0.95	U
Phthalic Acid/Phthalic anhydride	ug/L	10	U	10	U

Results indicate non-detectable concentrations for all specialty compounds with the exception of nonylphenol. Nonylphenol was the only detected specialty compound at concentrations ranging from 29 to 38 ppb. These concentrations are lower than the REACH screening benchmark of 54 ug/L. Based on the groundwater data (adjacent to the Detention Basin), the collection of additional specialty compound data is not necessary for characterizing nature and extent or for characterizing risk. The available data for surface water and sediment, including metals, inorganics, VOCs, and SVOCs are adequate for the purposes of characterizing nature and extent and for conducting the risk assessments for the Detention Basin. Given the broader

range of detected analytes in sediment it is reasonable that organic contaminates in groundwater partition to highly organic sediment present in the detention basin that has accumulated from decomposition of aquatic plants in the basin.

Comment No. 156: Page 4-8 and 4-9, Section 4.1.4.1. The most frequently detected SVOCs are BEHP, phenol, and benzaldehyde, according to Table 4.1-7. Phenol and benzaldehyde should be added and 3,4-dimethylphenol removed. A large number of metals were detected in every sample collected and should be included in the list of most-frequently detected analytes. These metals include arsenic, barium, beryllium, cadmium, cobalt, copper, lead, magnesium, manganese, nickel, potassium, silver, vanadium, and zinc.

Response No. 156: Metals are naturally occurring and soluble and it is expected they will be detected frequently, as they are in reference or background samples. The presence of other chemicals will be acknowledged in the text as well as those metals that are naturally occurring. The purpose in focusing on the other most commonly detected analytes is to alert the reader to those constituents that are most characteristic of the chemical impacts, and are ultimately the most important. All the constituents are considered in the risk characterization and those which are important from a risk perspective will be identified. It is equally important to not distract the readers understanding of the site by placing undue emphasis on detected constituents that are of minor or little importance.

USEPA Reply: In Section 4.0, it is commonplace to describe how many metals have been detected while also indicating how many of those metals exceeded comparison criteria. It is important to give an overall picture and then, through comparisons to criteria, begin to narrow down the discussion to those most "important". Please revise the text accordingly.

Olin Response to USEPA Reply: *The most frequently detected metals and metals exceeding RSLs will be identified and discussed to highlight those that are most important to understanding impacts at the Site in Section 4 of the draft OU1/OU2 RI.*

Comment No. 160: Page 4-10. Section 4.2.1. Olin states Plant B area is the source of TMPs to East Ditch. Is this also the source of TMPs to Central Pond and the Stormwater Detention Basin? Please discuss in Section 5.0.

Response No. 160: The source of low levels of TMPs will be discussed from a fate and transport perspective.

USEPA Reply: Please ensure the discussion in Section 5.0 will now include Central Pond and the stormwater retention basin.

Olin Response to USEPA Reply: *Plant B area is definitively not the source of TMPs to Central Pond and the Detention Basin. A discussion of impacts to Central Pond and the Detention Basin will be included in Section 5 of the draft OU1/OU2 RI,*

as requested. The TMPs present in the vicinity of South Ditch are not related to Plant B.

Groundwater in the vicinity of Plant B, and which is not captured by Plant B, flows eastward. The fifteen shallow overburden groundwater wells located between Plant B and Central Pond and the Detention Basin did not detect TMPs. (E-10, W-10, GW-304, GW-305, GW-306, GW-307, GW-308, GW-6S, GW-17S, GW-7, GW-79S, GW-78S, GW-51S, and GW-52S). The corresponding five deep overburden wells also did not detect TMPs (GW-52D, GW-6D, GW-3D, GW-51D, and GW-17D).

Comment No. 161: Page 4-10. Section 4.2.1. Please add possible migration of groundwater to headwaters of Landfill Brook. The headwaters of the brook are south of the contaminated drinking water wells on Cook Ave. Therefore, it is not unreasonable to assume groundwater migration may also contaminate the brook. The headwaters of the brook are located down gradient of the Site and cross gradient to Woburn Landfill.

Response No. 161: A detailed discussion of the evidence of geochemical impacts from the Woburn Sanitary Landfill to groundwater surrounding Landfill Brook and Landfill Brook will be prepared.

USEPA Reply: In addition to a detailed discussion about the Woburn Sanitary Landfill, please include details about the potential groundwater impacts from the Site to the headwaters of the (down gradient) Landfill Brook.

Olin Response to USEPA Reply: *Based on a thorough review of hydrogeology associated with the headwaters of Landfill Brook and the surrounding area, including groundwater chemical data, groundwater impacted by the Olin site is not impacting the headwater of Landfill Brook. The deep bedrock groundwater impact at Cooke Ave residential wells consists of low part per trillion concentrations of NDMA, and has no bearing on groundwater quality within the Landfill Brook headwaters. This information was presented to USEPA in a meeting on November 19, 2013. As discussed in said meeting, impacts from the Woburn Landfill to Landfill Brook will be described in Section 4 of the draft OU1/OU2 RI. The discussion summarizes the hydrogeologic setting and geochemical discrimination of impacts from the Woburn Sanitary Landfill to the headwaters of Landfill Brook and downstream. As discussed in the meeting, the impacts from the Olin Site are certainly de minimis, if even measurable, and the draft OU1/OU2 RI will conclude that Landfill Brook is not impacted from releases at the Olin Site.*

Comment No. 162: Page 4-10. Section 4.2.2. West off-Property soils have been eliminated from the risk assessment as representative of an area not impacted by the Site. Please demonstrate this by discussion and presentation of west off-property soils separately from east off-property soils.

Response No. 162: A table presenting only the soil data from off Property locations to the west of the site will be added and the data will be discussed separately as requested.

USEPA Reply: Upon further review of data from the Pam Am railway soils, EPA concludes that these soils (and this area) should be carried through the quantitative risk assessment. Also see HHRA Interim Deliverable #2, Comment No. 1.

Olin Response to USEPA Reply: *Analytical data associated with soil samples from the off-property locations west of the Site will be included in the summary of investigations (Section 3) and the nature and extent (Section 4) portions of the draft OU1/OU2 RI. At the November 19, 2013 meeting with the USEPA, the topographic setting of the Pan AM railroad bed was discussed along with the elevated arsenic and PAHs in soil that are associated with the former railway activities. It is our understanding following this meeting that USEPA concurs that these impacts are unrelated to the Olin Site and do not represent data gaps. The nature and extent evaluation (Section 4.0) of the draft OU1/OU2 RI will present this information and conclude that the soil samples collected off-Property to the west represent impacts from the Pan AM railroad bed rather than impacts from the Olin Site, and therefore are not part of the Site, and will not be evaluated quantitatively in the HHRA for the Site.*

Comment No. 166: Page 4-11, Section 4.2.2.1, Perimeter. In addition to arsenic and chromium, elevated concentrations of PAHs (benzo(a)pyrene), as shown in Figure 4.1-14, are present west of the property. Therefore, PAHs have not been bounded in this area. Olin asserts it is not feasible to bound west of SS445. Please confirm that this sample is as close to the drainage swale as possible.

Response No. 166: Sample SS-445 is on the eastern side of the property. Please clarify the comment.

USEPA Reply: Sample SS-445 was a typo – SB-443 is west of the property and benzo(a)pyrene is above the industrial RSL. Please confirm that this sample is as close to the drainage swale as possible.

Olin Response to USEPA Reply: *SB-433 sample was collected at the top of the slope located on the former Pan AM railroad bed, adjacent to off-PWD. As discussed in the November 19, 2013 meeting with USEPA, railroads are sources of PAHs and other constituents. This is supported by the high frequency of PAH detections in Off-PWD sediment adjacent to the rail bed. Olin will also include information summarized from the MassDEP BMP-Development of Rail Trails, specifically that "Railroads are known to have elevated metals, pesticides, (such as lead arsenate), and constituents of oil or fuel (petroleum products). It would not be uncommon to find arsenic (up to ten times natural background levels) present in the soil along a right-of-way from old railroad ties dipped in an arsenic solution, arsenic weed-control sprays, and arsenic laced slag used as the railroad bed fill. Lubricating oil and diesel that dripped from the trains are likely sources of the petroleum product found along the lines. Other sources of contaminants associated with historic railroad operation may include coal ash from engines, creosote from ties, and PAHs from the diesel exhaust."*

Comment No. 167: Page 4-12. Section 4.2.3.1. There is concern about the usability of surface water and sediment samples SDBK-002 and SDREF-012 as background. In March 2013 meetings with Olin, it was agreed that the sample location SDBK-001, north of the Eames Street Bridge, was a valid background location for comparison to the East Ditch surface water and sediments and that sample location SDBK-004, the Wildwood Street location, was a valid background location for comparison to the MMBW samples. SDBK-002 and SDREF-012 are located at or in close proximity to the Spinazola Landfill. Olin is using the combined background information from the two questionable sampling locations as well as SDBK-001 and SDBK-004 to bolster their argument for not evaluating MMBW. Olin assured EPA that it would not be using background surface water and sediment to eliminate COPCs or calculate risks associated with background conditions, but here the background is used to eliminate not just COPCs, but an entire area. EPA considers SDBK-004 as the only valid background sample location for comparison to surface water and sediment samples at MMBW.

Response No. 167: This issue has been discussed and resolved per other comments on the same topic.

USEPA Reply: Based on a review of the HHRA Interim Deliverable #2, Olin continues to use one of the sediment/surface water locations (SDBK-002) that EPA does not approve.

Olin Response to USEPA Reply: *The HHRA will be revised to address this inadvertent oversight.*

Comment No. 172: Page 4-13 and 4-14, Section 4.2.3.3, Metals and Inorganics. Other inorganics detected in every surface water sample from the East Ditch include nitrate, barium, copper, iron, magnesium, manganese, and sodium. These should be added to the text.

Response No. 172: These additional analytes will be noted while acknowledging those which are naturally occurring and /or not necessarily site-related.

USEPA Reply: See HHRA Interim Deliverable #2, Comment No. 1 and note that contaminants that may occur naturally, but also have known historical use or production at the Site, should be acknowledged as potentially Site-related.

Olin Response to USEPA Reply: *As discussed with the USEPA, analytes known to be associated with raw materials, products, or waste streams etc. at the Site will be identified as chemicals of interest. The East Ditch discussion will include reference to metals and inorganics identified above in the original comment. The text will be revised to indicate whether or not these analytes are potentially related to the Site.*

Comment No. 174: Page 4-14 Section 4.2.3.3 states “further downstream (EDSD/SW0)”, but this sample is north on the upstream end of East Ditch.

Response No. 174: Flow direction reverses in East Ditch north of Eames Street due to changes in the grade of the rail road bed. Discussion of direction is relative to flow.

USEPA Reply: Agreed, but the second sentence of the text states that the discussion starts north or upstream of the facility at "EDSW0", which contradicts the response. EPA suggests separating the discussion into sections for each reach of the ditch so that each "upstream to downstream" discussion stands on its own. Note: please present the location names consistently or clarify if these are two different sample locations.

Olin Response to USEPA Reply: *The discussion of East Ditch will be clarified as suggested by dividing the discussion into reaches.*

Comment No. 175: Page 4-14. Section 4.2.3.3. Are ammonia and NDMA sufficiently bounded in East Ditch? EPA notes that although ammonia and NDMA levels at the southern end of East Ditch are lower than those found in South Ditch, ammonia concentrations in this area are still above the ecological benchmark and NDMA concentrations in this area are still detected well above the tap water RSL. It is currently inconclusive on whether ammonia and NDMA in surface water have been adequately delineated in surface water in the East Ditch. EPA recommends collecting additional surface water samples from ED SD/SW7 and/or further downstream.

Response No. 175: Ammonia and NDMA are sufficiently bounded in East Ditch. As per previous discussions with USEPA on the matter, NDMA was not detected in the sample collected from EDSD/SW 7 during the most recent sampling event (November 2012). Ammonia was detected, but at low concentrations. Sample EDSD/SW 7 is approximately 800 feet from Halls Brook Holding Area, which is associated with the Industriplex site remedy. Ammonia concentrations are known to be elevated in the Halls Brook Holding area, in fact well in excess of the ammonia concentrations detected in the south end of East Ditch. Therefore, additional sample collection for ammonia from the south end of East Ditch would not yield results that would lend any additional explanation to the nature and extent considerations of the RI.

USEPA Reply: Although NDMA was not detected in the most recent sampling event (November 2012), it was detected in the previous round (June 2012). Collection of additional samples would be necessary to reach a conclusion that NDMA is bounded to the south in East Ditch.

Ammonia continues to be detected and EPA cannot conclude that ammonia contamination in East Ditch is fully bounded. However, EPA does concur that the full nature and extent of contamination in this area of East Ditch has been sufficiently characterized, and in consideration of existing conditions immediately downstream of EDSD/SW 7, EPA concurs that additional sample collection from the south end of East Ditch would not yield results that would lend any additional explanation to the nature and extent considerations of the OU1/OU2 RI.

Olin Response to USEPA Reply: *No response required.*

Comment No. 181: Page 4-16, Section 4.2.3.5, SVOCs. The second paragraph compares NDMA concentrations to ecological screening benchmarks. If used, these benchmarks should be identified and the specific concentrations listed for comparison. In addition, please include a comparison to tap water screening levels.

Response No. 181: A reference to the BERA will be added. The BERA contains the ecological screening benchmarks.

USEPA Reply: The reader should not be forced to look through another document to find the comparison benchmarks. Please include ecological screening benchmarks when using them for comparison.

Olin Response to USEPA Reply: *The text in Section 4.2.3.5 will be revised to identify the NDMA benchmark.*

Comment No. 182: Page 4-16, Section 4.2.3.5, Specialty Compounds. The section describes a review of the distribution of hydrazine and formaldehyde. This distribution should be described (e.g. locations where detected and not detected). Also, hydrazine is not a common contaminant. Additional evidence is required for the assertion that hydrazine and formaldehyde detected in the wetland are not related to the site.

Response No. 182: Formaldehyde occurs naturally and is as a common anthropogenic contaminant that is deposited atmospherically. Hydrazine is an unstable compound and is difficult to analyze for due to interferences that can result in false positive detections. For hydrazine to be site-related and present in the wetland it would need to be transported in groundwater at significant concentrations from the Site. Hydrazine is detected sporadically at the site but always at low concentrations. There is no documented groundwater pathway from the Site that could explain the detection of hydrazine in only one sample at a low estimated concentration (e.g. below the reporting limit). When a compound is detected only once from multiple samples and sample rounds and at such low estimated concentrations it should not be assumed to be present unless there is other data that clearly documents a confirmed migration pathway.

USEPA Reply: The text included in Olin's response should be included in the Section 4.0 text. However, it should also be noted that both formaldehyde and hydrazine have been used/stored at the Site, leading to the possibility that their presence could be Site-related. Without having an understanding (yet) of groundwater interactions with these contaminants, and without knowing whether groundwater could act as a migration pathway, these contaminants cannot be ruled out as being from solely non-site-related sources. See HHRA Interim Deliverable #2, Comment No.1.

Olin Response to USEPA Reply: *The text in Olin's response will be included in Section 4.0 as requested. In addition, the nature and distribution of these constituents in overburden groundwater will be discussed and presented on a figure.*

Comment No. 184: Page 4-17. Section 4.2.4.2. Off-Property West Ditch - Because of the small size of the sediment dataset and the lack of movement of sediment, inclusion of older data from 2003 and 2004 may be a reasonable approach.

Response No. 184: The recent RI sediment data set is adequate as agreed with USEPA and inclusion of older data is not necessary.

USEPA Reply: There are three samples, two of which were evaluated for VOCs, SVOCs, metals, inorganics, and specialty compounds. The third was evaluated for VOCs, SVOCs, metals, and inorganics, but most of the VOCs and SVOCs results were rejected. This is the comment made on the OU2 data gaps memo Olin sent out in March 2013: "The RI dataset is very small, too small to 'reliably calculate risk'. EPA acknowledges the limited area. No further sampling is requested. Because of the small size of the dataset, and the lack of movement of sediment, inclusion of older data from 2003 and 2004 may be a reasonable approach. Otherwise, risk calculations will be based on maximum concentrations. Even with the inclusion of older data, the dataset may still be too small for calculation of 95%UCLs for some contaminants; however, the dataset would be considered adequate to evaluate risk." The March 7, 2013 meeting notes state that we agreed to use just these three samples in the risk assessment, but to use older sediment data as well as the RI sediment data in the nature and extent evaluation. Please revise this section to reflect this approach.

Olin Response to USEPA Reply: *The nature and extent evaluation for the off-PWD will be revised to include the historical sediment data.*

Comment No. 185: Page 4-17. Section 4.2.4.2. Olin used background, including Spinazola locations, to conclude off-PWD sediments are not site related. As noted in Comment 167, EPA is not in agreement with the use of these samples as background. Off-PWD sediments should be retained and evaluated in the HHRA.

Response No. 185: The off-PWD sediments were not excluded from the HHRA and a trespasser scenario was evaluated.

USEPA Reply: EPA agrees that the off-PWD sediments were not excluded from the HHRA and a trespasser scenario was evaluated. However, EPA is not in agreement with the use of these samples as background. See Comment No.167.

Olin Response to USEPA Reply: *Olin has agreed not to use the two background sediment samples near the Spinazzola Landfill as reference locations. The draft OU1/OU2 RI text will be revised accordingly.*

Comment No. 187: Page 4-18, Section 4.2.4.2, Specialty Compounds. Formaldehyde was detected in both samples analyzed for. Given the common presence of formaldehyde in environmental media (including on-property soil, sediment and surface water), the formaldehyde detected may have originated at the property. Further evaluation of the formaldehyde is required to rule out the property as a source.

Response No. 187: Formaldehyde occurs naturally and is as a common anthropogenic contaminant that is deposited atmospherically. USEPA references concerning formaldehyde in the environment will be provided.

USEPA Reply: Given that formaldehyde was used as a raw material and produced as a by-product, it is not reasonable to assume that the formaldehyde is naturally occurring at this Site without more data. This could include a comparison to background.

Olin Response to USEPA Reply: *References concerning formaldehyde and the environment will be included. Reference locations were not analyzed for formaldehyde. The formaldehyde analytical data for sediment samples from the off-PWD will be compared to all other formaldehyde analytical data associated with sediment samples collected from the South Ditch (OU1) and separately, for OU2 (East Ditch, MMBW) to determine if there is evidence of a site-related release to the off-PWD sediments. A preliminary review of the data suggests similar concentrations of formaldehyde in sediments from off-PWD, South Ditch, East Ditch, and MMBW. The concentrations in the MMBW (furthest from the site) are actually somewhat higher than in the other locations. The distribution of formaldehyde in overburden groundwater will be presented and discussed as an additional line of evidence that the widespread detection of formaldehyde in the environment is unrelated to the Site.*

Comment No. 189: Page 4-18. Section 4.2.4.3. Olin suggests other sources, including "Industriplex and Woburn Landfill", for sediments in East Ditch contaminated with ammonia, chromium, hexavalent chromium. Industriplex is located downstream from Olin and the relationship needs to be clarified. Please discuss the relationship between these sites in greater detail in Section 5.0.

Response No. 189: It was pointed out that there were and are multiple sources for impacts to East Ditch. Industriplex boundary along East Ditch starts in front of the Woburn Landfill where removal actions occurred.

USEPA Reply: The response does not address the comment, which requires additional details. Olin will need to include these potential sources on a map, explain which may or may not be down gradient or downstream, and evaluate the concentrations emanating from these other potential sources if they believe them to be sources.

Olin Response to USEPA Reply: *The point of the draft OU1/OU2 RI text in question was not to suggest that the Olin Site was not a contributor to the East Ditch, but was one of several potential contributors. For example, the USEPA Final Site Inspection Prioritization Report for E.C. Whitney (1993) identifies Raffi and Swanson, US Pigments and Resins; E.C. Whitney Barrel and Woburn Landfill, and other as inputs. That study focused primarily on VOC and fuel oil compounds. In addition, concentrations of ammonia and chloride in sediment from Landfill Brook are higher*

than those found in South Ditch. Currently, sediment is not present between East Ditch/South Ditch confluence and East Ditch/Landfill Brook confluence. As such, it is not feasible through sampling to quantify other potential inputs other than Landfill Brook. Olin will clarify the text in the draft OU1/OU2 RI.

Comment No. 192: Page 4-21, Section 4.2.4.5, Specialty Compounds. Formaldehyde was detected in 49 of 50 OU1 surface soil samples, 16 of 26 OU1 shallow subsurface samples, and 43 of 45 OU1 deep subsurface soil samples. It was also detected in surface water and on-site sediment. Discussion of groundwater is needed before determination of what contaminants in MMBW are or are not site-related. Therefore, formaldehyde cannot be considered "not" a site-related constituent and should be retained.

Response No. 192: Formaldehyde occurs naturally and is as a common anthropogenic contaminant that is deposited atmospherically. Further discussion of groundwater will also be provided.

USEPA Reply: As noted above in comment No. 187, it should also be noted that formaldehyde has been used/stored at the Site, leading to the possibility that its presence could be Site-related. Without having an understanding (yet) of groundwater interactions with these contaminants, and without knowing whether groundwater could act as a migration pathway, this contaminant cannot be ruled out as being from solely non-site-related sources. See HHRA Interim Deliverable #2, Comment No.1.

Olin Response to USEPA Reply: *Formaldehyde is frequently detected but it is detected in a narrow and consistent range at low concentrations in surface, and subsurface soil. Formaldehyde was also detected in five background soil samples at similar concentrations. The maximum concentration detected in surface and shallow and deep subsurface soil is 5 orders of magnitude lower than the Industrial RSL. There are no areas of anomalously elevated concentrations of formaldehyde in soil at the Site that would be indicative of a release. The high frequency of detection and the uniformly low concentrations indicates formaldehyde is widely distributed in the environment and it presence is likely due to anthropogenic sources. The USEPA Air Toxics Program fact sheet on formaldehyde reports it is detected in ambient air in urban areas nationwide from anthropogenic sources that include power plants and automobile exhaust. Aquatic screening levels (literature derived AWQCs) for formaldehyde are 2-3 orders of magnitude higher than concentrations detected in South Ditch surface water. Lastly formaldehyde is not detected in any shallow groundwater well sampled on-property. It was only detected in one deep overburden groundwater well on- property (GW-10DR). Formaldehyde is present in DAPL.*

The body of RI data indicates formaldehyde is not a COI for OU1/OU2 soil, or surface water and is not transported to surface water from groundwater.

Section 5.0:

Comment No. 199: Page 5-3. 3rd paragraph. Section 5.2. Please include Landfill Brook in the surface water features within the Aberjona Watershed.

Response No. 199: Landfill Brook will be included with appropriate acknowledgement that impacts there are not site-related.

USEPA Reply: Please include the results of the evaluation prior to making the statement that impacts there are not Site-related. See HHRA Interim Deliverable #2, Comment No.1.

Olin Response to USEPA Reply: *The information presented to the USEPA during the November 19, 2013 meeting concerning the Woburn Sanitary Landfill and its impacts on Landfill Brook will be included in the draft OU1/OU2 RI.*

Comment No. 200: Page 5-3, last paragraph. Section 5.1. Arsenic was detected above industrial RSLs and site-specific background concentrations in soil, with a maximum concentration of 56 mg/kg in soil. Additional evaluation is required to support the contention that none of the arsenic is site-related.

Response No. 200: Additional discussion will be provided.

USEPA Reply: Also see HHRA Interim Deliverable #2, Comment No. 1.

Olin Response to USEPA Reply: *Statistical review of the arsenic data indicates it is a single sample population with distinct outliers (i.e., a large difference in arsenic concentrations for specific samples) that were identified in soils located along the Pan AM railroad bed, and the OU2 soils in EA5. These two off-property locations are adjacent to railway lines and have higher arsenic concentrations than any of the on-property exposure areas, the Containment Area, and the background soil sample areas.*

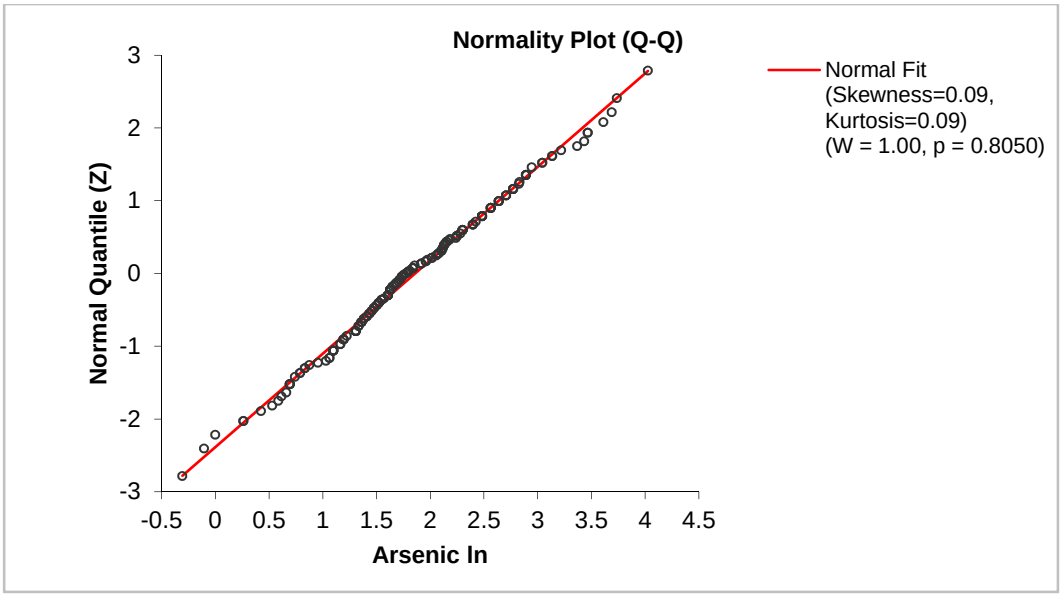
As indicated in the MassDEP BMP-Development of Rail Trails; "Railroads are known to have elevated metals, pesticides, (such as lead arsenate), and constituents of oil or fuel (petroleum products). It would not be uncommon to find arsenic (up to ten times natural background levels) present in the soil along a right-of-way from old railroad ties dipped in an arsenic solution, arsenic weed-control sprays, and arsenic laced slag used as the railroad bed fill."

This information suggests that sources and releases of arsenic should be expected at the two off-property locations (Pan AM railroad bed and EA5) from railroad operations.

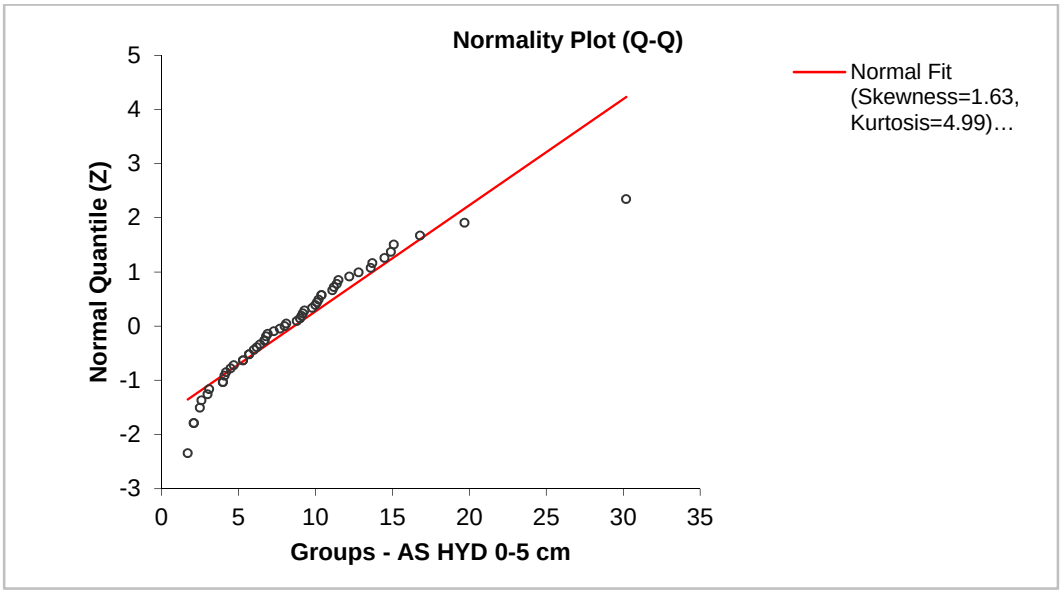
The following graphs represent the distribution of arsenic in soil for OU1 with the two outlier areas (Pan AM railroad bed and EA5) removed from the sample population

and of USGS Soil Background Data for Maine and New Hampshire. Both data sets are Log-transformed with normal distributions that represent a single sample population that is background.

Arsenic Log-transformed – Surface Soil (Olin Data) (Normal-One Population)



USGS – Arsenic Log-transformed Background Soil – Maine & New Hampshire



Review of the graphs and data indicate arsenic concentrations are consistent in OU1 surface soils among all of the exposure areas and represent a single sample population. This would indicate a background data set and does not indicate a release of arsenic.

Comment No. 204: Page 5-4. Section 5.2. There is potential for vapor intrusion into future buildings associated with TMPs in both areas of soil TMP impacts (under the parking lot east of the former administrative building, as well as in the EPH/VPH area).

Response No. 204: The HHRA will contain an evaluation for vapor intrusion.

USEPA Reply: Discussion is needed in Section 5.2 based on the results of the HHRA VI evaluation contained in HHRA Interim Deliverable #2.

Olin Response to USEPA Reply: *The VI evaluation will be discussed in Section 5.2 and Section 6.0 of the draft OU1/OU2 RI.*

Comment No. 205: Pages 5-5 through 5-7. Sections 5.2.1 and 5.2.2 contain numerous statements with no evidence in the report to support them. Additional information is needed as follows:

a. Water levels have not been provided to substantiate the assertion that vertical hydraulic gradients are small within the aquifer beneath the MMBW. The following should be added to Section 3.0 and referenced in this section: water level data and gradient calculations based on that data. Contaminant travel times should also be discussed in these sections.

b. Evidence must be provided for the assertion that the surface water systems are hydraulically connected to shallow groundwater and that most streams receive input from groundwater. These include comparison of water levels in the surface water bodies to nearby shallow monitoring wells or piezometers (this should be added to Section 3.0 and that section referred to in Section 5.0) and comparison of indicator concentrations in surface water bodies to nearby shallow groundwater monitoring points (this should be added to Section 4.0).

c. Groundwater data has not been included in this report to substantiate the statements regarding potential site-related impacts to shallow groundwater. Another subsection should be added to Section 4.0 to address shallow groundwater and assist with evaluation of the surface water. This should include complete analytical results (potentially as a new appendix), discussion of which analytes can be considered site-related for the purpose of determining migration to surface water, and figures showing shallow groundwater concentrations.

Response No. 205:

a. The additional water level data will be provided. Contaminant fate and transport modeling has not been conducted and is very complex due to historical subsurface movement of DAPL and the complex geochemistry associated with diffuse material. Therefore contaminant travel times will not be discussed and is by definition an OU3 topic.

b. Other piezometric data (from the SASRs) will be provided in tables.

c. A subset of pertinent groundwater data will be provided in a summary table or Appendix.

USEPA Reply: *see below.*

a) Contaminant fate and transport modeling of DAPL has not been requested for the OU1/OU2 RI; however, the groundwater velocity and potential transport of dissolved constituents is important in evaluating transport to surface water bodies and should be included.

c) Please provide details on how a subset of pertinent groundwater data will be created.

Olin Response to USEPA Reply: *We will provide water levels as requested and calculation/discussion of vertical gradients to substantiate our positions. However, contaminant travel times are not needed to fulfill the purpose of the RI reporting effort. The fact is that we know where groundwater is impacting surface water (due to the existence of impacts to surface water) and have indicated that we will discuss this in the RI report. We have the data necessary to draw appropriate conclusions regarding nature and extent of contamination in the environmental medial associated with OU1/OU2 and the corresponding risk to human health and the environment (if any exists). This will all be presented in the RI report.*

c. Pertinent groundwater data will be presented in the form of distribution figures for overburden groundwater for constituents which USEPA has indicated an interest in determining whether the chemical/constituent is site related or not.

Comment No. 207: Page 5-6. Section 5.2.1. The exception noted by Olin negates the assertion that the "contaminant migration pathway from groundwater to surface water bodies within the Ipswich watershed via shallow groundwater discharge is not complete". Please remove the statement.

Response No. 207: The pathway is largely incomplete and the statement will stand with acknowledgement of one detection of NDMA.

USEPA Reply: It is difficult to evaluate the assertion that only one location in the MMBW is impacted by Site-related groundwater, as the surface water and sediment results (Table 4.2-6 and 4.2-10) are provided without comparison to any criteria. Other analytes detected in the surface water which are related to plant processes include multiple detections of formaldehyde (as discussed in several comments), Kempore, and NDPrA, in addition to other analytes which may not be as readily traced to the Site as opposed to other sources. Acetaldehyde and formaldehyde were also detected in sediment. Olin should provide additional evidence, such as groundwater flow paths and gradients, to show that the contaminant migration pathway from Olin is not a concern for the MMBW. See HHRA Interim Deliverable #2, Comment No.1. Also note that the list of indicator parameters described on page 5-9, including copper, cobalt, and manganese,

which have been detected in South Ditch surface water, should be used in this evaluation.

Olin Response to USEPA Reply: *First of all, our conclusions are not assertions; they are conclusions based solely on data rather than speculation or contrivance. Second, we have clearly shown that the groundwater impacts related to past site activities only exists to any appreciable extent in deep groundwater underlying MMB. The shallow groundwater is not impacted to a large extent. We only observed NDMA in MMB surface water one time at an estimated concentration (below the laboratory detection limit). Olin has agreed to provide additional discussion of groundwater in context to migration pathways to surface water receptors in the draft OU1/OU2 RI. Olin does not agree that copper, cobalt and manganese detections in South Ditch surface water, which are all naturally occurring elements, have any bearing what so ever on Site impacts, let alone within the Ipswich watershed. Formaldehyde is not a groundwater contaminant with a pathway to the MMB. Kempore has limited solubility and should not be considered a mobile contaminant or a good indicator of contaminant pathways or impact. This will all be demonstrated in the RI report.*

Comment No. 211: Page 5-7. Section 5.3 states that the "VI migration pathway associated with OU1 soil and shallow groundwater at the Property has been evaluated….." Please provide this evaluation.

Response No. 211: The evaluation is included in the second interim deliverable.

USEPA Reply: The VI evaluation in the HHRA Interim Deliverable #2 is limited to a qualitative evaluation of potential VI from OU1 soils. Please delete reference to the VI evaluation of shallow groundwater and note that although the pathway is not currently complete, total VOC concentrations in soil in four areas of the Site (EA3, EA7, the former Lake Poly area within EA1, and the containment area) indicate potential future vapor intrusion concerns if occupied buildings were to be constructed there without preventative measures.

Olin Response to USEPA Reply: *The HHRA will evaluate potential exposure and risk for hypothetical future industrial/commercial buildings that could be constructed in EA3, EA7, and the former Lake Poly area. . The containment area will capped and no buildings will be erected there such that VI is an incomplete pathway.*

The reference to shallow groundwater will be removed. Potential vapor intrusion from groundwater will be evaluated in the OU3 RI.

Comment No. 212: Page 5-9. Section 5.4 states "Hexavalent chromium has not been determined to pose a risk to human or ecological receptors and is not discussed further." What is this determination based on? Please provide supporting information.

Response No. 212: This statement was from the PRI which has a complete RA. The statement will be retained if consistent with the current RA which is based on a larger dataset of hexavalent chromium data.

USEPA Reply: Fate and transport discussion of hexavalent chromium should be included in the OU1/OU2 RI as a Site-related contaminant and potential marker contaminant regardless of the HHRA and ERA. See HHRA Interim Deliverable #2, Comment No.1.

Olin Response to USEPA Reply: *Olin has agreed to include a general discussion of the fate and transport of hexavalent chromium in Section 5.0 of the draft OU1/OU2 RI.*

Comment No. 213: Page 5-9, second paragraph. Section 5.4. Although hexavalent chromium in groundwater may be expected to be rapidly reduced to trivalent chromium in groundwater, it still remains in soil at concentrations above direct-contact criteria. Hexavalent chromium in soil exceeds industrial RSLs and should be discussed.

Response No. 213: The final version of the section 5.0 will consider the final conclusions of the RA and focus on analytes that contribute to risk.

USEPA Reply: Contamination, including hexavalent chromium, with known Site history, should be discussed in the fate and transport section regardless of the results of the risk assessments.

Olin Response to USEPA Reply: *As indicated above, Olin has agreed to include a general discussion of the fate and transport of hexavalent chromium in Section 5.0 of the draft OU1/OU2 RI.*

Comment No. 215: Page 5-10. Section 5.4. This section would benefit from being divided into separate sections describing the fate and transport of the compound groups, rather than a series of bullets: for example, NDMA, ammonia, metals, BEHP/SVOCs, and TMPs/VOCs. Other analyte groups, such as PAHs, should be added to this discussion if they exceed screening criteria.

Response No. 215: The comment will be considered and if re-arrangement of the discussion ads clarity it will be modified.

USEPA Reply: Please revise the text to include other analyte groups, such as PAHs, if they exceed screening criteria.

Olin Response to USEPA Reply: *Other analyte groups such as PAHs will be included and discussed in Section 5.0 as requested to the degree the contaminant is important, relative to risk posed by the contaminant to human or ecological receptors.*

Comment No. 216: Page 5-10. Section 5.4 describes the DAPL fate and transport. The relevance of the DAPL should be tied to the soils, sediment, and surface water.

Response No. 216: The section will be reviewed and additional discussion of DAPL will be included if warranted. Note that DAPL is not applicable to unsaturated soil, sediment and surface water.

USEPA Reply: The additional discussion should also include that the DAPL and the diffuse layer serve as sources of contamination via groundwater to soil, sediment, and surface water.

Olin Response to USEPA Reply: *The CSM relating DAPL and diffuse groundwater and groundwater migration of dissolved constituents to surface water bodies will be included in Section 5.0 of the draft OU1/OU2 RI.*

Appendix E:

Comment No. 217: The following data are missing or not bookmarked:

Description	**On CD (Y/N)**	**Bookmarked (Y/N)**
Lab Reports Associated with DV Report for 2010 OU1 SW/Sediment	No	No
Lab Reports Associated with DV Report for 2010 OU2 SW/Sediment	No	No
Lab Reports Associated with DV Report for June 2011 OU1/OU2 SW	No	No
Lab Reports: 360-33835, 360-33892, 360-34011, 360-34709 (May/June 2011 Slurry Wall)	No	Yes
Lab Reports: 360-35962, 360-35898 (Aug. 2011 Slurry Wall)	No	Yes
November 2011 Slurry Wall GW/SW/Sediment DV Report	Yes	No
Lab Reports: 360-37491, 360-37526, 360-37595, 360-37596	No	Yes
Lab Reports: 360-39255, 360-39262, 360-39434, 360-39540 (Feb-Mar. 2012 Slurry Wall SW/GW)	No	Yes
May/June 2012 Slurry Wall/Cap GW/SW DV Report	Yes	No
Lab Reports: 360-40743, 360-40846, 360-40979	No	No
June 2012 OU2 SW/Sediment DV Report	Yes	No
Lab Reports: 360-41200, 360-41203	No	No
August 2012 Slurry Wall/Cap GW/SW DV Report	Yes	No
Lab Reports: 360-42351, 360-42352	No	Yes
November 2012 Slurry Wall/Cap GW/SW/Sediment DV Report	Yes	No
Lab Reports: 480-28728, 480-28687, 480-28600, 480-28730	No	No
November/December 2012 SW/Sediment OU1/OU2 DV Report	Yes	No
Lab Reports: 480-27937, 480-27939, 480-30406, 480-30497	No	No
December 2012 Soil DV Report	Yes	No
Lab Reports: 480-29484, 480-29598, 480-29976, 480-30106, 480-30197, 480-30346	No	No

Please verify that all laboratory data associated with OU1 and OU2 RI sampling events are included in this document.

Response No. 217: The data content will be verified.

USEPA Reply: Please ensure that the missing data are added to the OU1/OU2 RI.

Olin Response to USEPA Reply: *The above lab data will be reviewed and indicate "when" and "by what means" the data was delivered to the USEPA (e.g. within SASRs). If the data was determined to have been accidentally omitted, it will be provided within the draft OU1/OU2 RI.*

Appendix I:

Comment No. 219: Formaldehyde and acetone are not naturally occurring. Background summary should be limited to metals, inorganics, and PAHs.

Response No. 219: Please consult readily available EPA literature. Formaldehyde is naturally occurring as a well as ubiquitous anthropogenic contaminant.

USEPA Reply: While formaldehyde is naturally occurring, it has a known history of use at the Site and, therefore, inclusion in the background data set is not appropriate.

Olin Response to USEPA Reply: *The background soil data set was agreed to by the USEPA, with consideration to USEPA literature, which states formaldehyde is a ubiquitous anthropogenic contaminant from the atmosphere. Because it is known to be a ubiquitous anthropogenic contaminant, it is quite important to understand it's presence in background so that site-related concentrations of formaldehyde can be placed in context. There is no technical justification by the USEPA to exclude formaldehyde from the background soil data set. Olin will evaluate other information, such as groundwater data, to ascertain if formaldehyde was released in a manner that would result in soil impacts.*

Appendix J:

Comment No. 221: Table 4.2-1 and 4.2-2 include EPA Soil Screening Level (SSL) values. These tables identify a large number of SSL exceedances for contaminants that are not described in Appendix J. Olin may determine that these contaminants are not a concern for leaching, but they should be included in the initial screen. Comparison of the average concentration for contaminants with more than 10 detections to the SSL, if available, found the following contaminants with average concentrations above the SSL:

a. Surface soil (0-1 foot): benzo(a)anthracene, benzo(a)pyrene, benzo(b) fluoranthene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate (BEHP), dibenz(a,h)anthracene,

indeno(1,2,3-cd)pyrene, n-nitrosodiphenylamine (NDPA), arsenic, hexavalent chromium, cobalt, iron, lead, manganese, mercury, silver, and acetaldehyde.

b. Shallow subsurface soil (1-10 feet): acetone, ethylbenzene, toluene, benzoic acid, BEHP, butylbenzylphthalate, di-n-butylphthalate, NDPA, antimony, arsenic, hexavalent chromium, cobalt, iron, manganese, mercury, silver, and acetaldehyde.

c. Deep subsurface soil (>10 feet): BEHP, NDPA, arsenic, hexavalent chromium, cobalt, iron, manganese, silver, and acetaldehyde.

d. Olin may elect to use different criteria for comparison, but should explain the selection process in Appendix J. Although additional figures may not be necessary, all analytes retained should be described in Appendix J. Trimethylpentenes do not have SSLs, but should be retained as described in the existing discussion. Presumed site history should not be used to exclude or ignore known elevated soil concentrations.

Response No. 221: Tables 1-1 and 1-2 of Appendix J identify all analytical parameters detected in surface soil and shallow subsurface soil respectively. The tables present summary statistics for each detected parameter in soil and also provide summary statistics for those same parameters in shallow groundwater. If parameters are detected in soil but not in groundwater, or are detected with low frequency and low concentration in groundwater, that is real-world documentation that leaching is nor occurring to any significant degree. A detailed discussion of potential leaching for all parameters with soil concentrations above leaching-based SSLs would not change the conclusion that leaching is not a significant concern.

USEPA Reply: EPA has agreed to the comparison of soil and groundwater data, but requested a comparison to SSLs be provided as a preliminary step leading into the evaluation. Screening comparisons have been provided on tables, but the exceedances have not been discussed or used to help determine what contaminants to then look at in the soil vs. groundwater comparison. Please revise the discussion.

Olin Response to USEPA Reply: *USEPA requested that the SSLs be included for completeness for the draft OU1/OU2 RI. USEPA also acknowledged that the SSLs are extremely conservative and limit their usefulness as reliable indicators of which contaminants will leach from soils resulting in an impact to groundwater. Therefore, Olin compared actual distribution of soil data to actual distribution of groundwater contaminant concentrations to assess whether there were locations of elevated soil impacts that corresponded locally to similar groundwater impacts. These comparisons demonstrate very clearly that potential soil leaching is not a pervasive problem as suggested by the SSLs as a current source of on-going groundwater impacts.*

Comment No. 222: An explanation of leaching mechanisms, including potential percolation (areas of cover and non-covered soil) and depth of groundwater (zones of potential groundwater flow) should be added to the introduction.

Response No. 222: A brief discussion of leaching mechanisms and depth to groundwater at the Site will be added to Appendix J.

USEPA Reply: Please ensure percolation (via permeable vs. impermeable surfaces) is included in the evaluation and discussion of leaching mechanisms.

Olin Response to USEPA Reply: *Our response clearly committed to a discussion of leaching mechanisms as requested.*

Figures:

Comment No. 228: Figure 2.2-4 presents sediment sample locations for the RI discussions. Please include historical samples considered representative of current conditions and included in the HHRA (Figure 2.3-4). These data should be included in the RI discussions.

Response No. 228: As stated in the text, **Figure 2.2-4** identifies the 2010 OU1 RI sediment sample locations. The purpose of this Section 2 figure is to show the 2010 RI sediment sample locations because this particular section of the text is describing that investigation program. No change will be made to the figure.

USEPA Reply: These additional historical sample locations are considered to be representative and should be included on a figure in the OU1/OU2 RI, either on or separate from Figure 2.2-4, with a reference for the reader.

Olin Response to USEPA Reply: *The historic sample locations which are considered to be representative of current sediments will be presented on a separate figure from Figure 2.2-4. These sediments will be discussed in Section 4.0.*

Comment No. 230: Figures 3.3-1 and 3.3-2: Groundwater Elevation Maps –

a. Both figures have a note that water levels from May 2010 were used to verify the shape of the potentiometric surface in the southern portion of the map. The following are comments regarding this note and the plume contours south of the property boundary:

   i. If the data from these monitoring wells are used, they should be added to the figure, preferably with a different symbol to distinguish them from the other monitoring wells.

   ii. GW-75S is screened from 10-20 feet bgs and GW-75D is screened from 36-46 feet bgs. Water levels from GW-75S should have been used instead of GW-75D, which was indicated in the note.

   iii. Water levels from times outside the synoptic water level round are not generally applicable for water level maps. Olin should provide justification for inclusion of these monitoring wells, such as proof that the water levels in these wells do not vary significantly over time.

b. The existing water level maps show features that are not justified by existing data.

   i. The 82-foot contour west of the southern portion of the 51 Eames Street property boundary is shown as a closed loop with the water divide in the center. Although a bedrock knob is located in this area, this information is not sufficient to place the 82-foot contour. Please use dashed lines to represent the entirety of the contour, leaving the western side of the contour not depicted, given the lack of well control. Additional shallow monitoring wells that may have supported interpretations in this area include GW-68D to the east and GW-60S to the northwest. These wells should be included in future synoptic water level rounds.

   ii. The 80-foot contour southeast of the 51 Eames Street property is shown as a closed loop. Contours to the east appear to have been placed arbitrarily, with no well control to bound them. None of the data presented supports this interpretation. The bedrock knob, as shown on Figure 3.2-2 of the draft RI, is also not in the area shown. Wells GW-20, GW-72D and GW-75S should be included in future synoptic water level rounds, and the entire contour set southeast of the property boundary should be cut short if no data is available in this area.

c. For both figures, the northern end of the groundwater divide should be drawn south of the 82-foot contour instead of merging with it for a short distance.

d. The figures are difficult to read at the scale shown and should be re-sized so that the map view is zoomed in.

e. Water level contour scaling should be consistent. The 81.2-foot contour should be removed from both figures. Also, in Figure 3.3-2 the 80-foot contour on the east side of the 51 Eames Street property is adjacent to the 83-foot contour. Please revise as needed.

f. Additional well control is recommended for future synoptic water level rounds in preparation for the OU3 RI, including the area northwest of the 51 Eames Street property (GW-57D) and the area south of the LNAPL extraction area (GW-15, GW-306, or other nearby wells).

Response No. 230: The comments will be considered and discussed further as needed. As contour maps are interpretive by nature it is expected that there will be some disagreement with fine details however the general overall groundwater pattern and interpreted groundwater flow directions that results should not change. Intermediate contours are still equipoentials and are useful where gradients are extremely flat.

USEPA Reply: Factual errors in building the contours and readability issues should be addressed. The presence of apparently arbitrary contours south of the Site implies a degree of specificity that is not known in the southern portion of the Site based on current data. Groundwater contour maps in previous reports have not included these phantom contours. Please revise.

Olin Response to USEPA Reply: *We do not believe any factual errors exist. However, we will review the figures according to the comment to make sure that our groundwater contours are appropriately represented. . All available synoptic data was used and use of any supplemental data was clearly footnoted appropriately if used to improve areas of interpretation where data limitations were noted. Supplementing the primary data set with additional information that has been reviewed and evaluated does not constitute a factual error. Some of the comments suggest interpretative adjustments which will not affect the overall picture of groundwater flow at the Site and are changes which Olin has previously indicated it is not averse to considering. The following provide responses to individual USEPA original comments.*

i. *Several wells in the southern portion of the Site no longer exist, but there does exist decades of water level measurements from sampling events which allows an understanding of the consistency and variation of water levels between wells and at well pairs. Supplemental well data used will be noted on the figure.*

ii. *GW-75S no longer exists. Historical water levels between the now-abandoned GW-75S and GW-75D were evaluated for vertical gradient differences to help place the southern contours. Data used will be shown.*

iii. *Justification and data will be provided.*

iv. *The large bedrock protrusion is a major Site hydrologic feature, and is a continuation of a series of bedrock highs that protrude through the overburden , limiting the connection of overburden groundwater on either side of these features. The interpretation in question was based on the topographic contours and the depth of water in overburden observed on the opposite side of the bedrock protrusion when drilling GW-405 BR. That said, there is no objection to showing a gap in the contour as requested or using all dashed lines, as it has no effect on the interpretation of groundwater flow at the Site. Olin previously indicated it would consider this comment but did not see it as having an effect on the overall interpretation of groundwater conditions at the Site.*

v. *The 80 foot contour surrounds the Woburn Sanitary Landfill (WSL) and is based on topography, and historical groundwater data provided to USEPA. Since USEPA has on several occasions requested that Olin provide, to the extent possible, interpretation of groundwater conditions in this area of the Site, Olin questions why USEPA is now requesting this information be removed. A footnote will be provided concerning the WSL area.*

vi. *Effects on water levels from Plant B pumping make interpretation of the divide complex. Moving the location slightly south from the 82 foot contour is not objectionable and does not fundamentally change the interpretation.*

vii. We will review the size of the figures with regards to clarity and readability and will adjust them appropriately.

Comment No. 231: Figure 4.1-1 includes soil samples excluded from the HHRA. **Please distinguish results of data excluded from the risk assessments,** i.e. soils beneath Central Pond and South Ditch, west off-Property soils, VOC/VPH soil data collected in the EPH/VPH area prior to the operation of the AS/SVE, etc. from those used in the risk assessments on the figure and discuss these results separately in the RI. Please present surface soil, subsurface soil, and deep subsurface soil sample locations on separate figures.

Response No. 231: Figure 4.1 was prepared to support the Section 4 discussions of nature and extent of contamination. The samples included in that figure include samples representative of current conditions at the Site and the purpose of the figure is not to discuss the use of samples in the risk assessments (that is discussed in subsequent sections of the report). Figure 4.1-1 will be replaced by three separate figures, one each for surface soil, shallow subsurface soil, and deep subsurface soil.

USEPA Reply: The HHRA interim deliverables discuss data excluded from the HHRA, but the HHRA figure only shows the data included. Please distinguish in the RI the data used in the HHRA.

Olin Response to USEPA Reply: *Figure 4.1-1 will be replaced by three separate figures, one each for surface soil, shallow subsurface soil and deep subsurface soil. Locations not used in the HHRA will be distinguished from data used in the HHRA on the surface soil and shallow subsurface soil figures. The HHRA considered soil to maximum depth of 10 feet for a construction worker exposure condition. By definition, deep subsurface soils are not considered in the HHRA.*

Comment No. 232: *Figures 4.1-2 through 4.1-4:*

a. Arsenic soil figures use site-specific background (95%UPL) for comparison rather than RSLs, yet use the same symbols as the figures for other contaminants. EPA acknowledges the logic of comparing arsenic to background rather than RSLs; however, EPA suggests that different symbols should be used to avoid confusion or misinterpretation.

b. Arsenic contamination may not have been fully delineated in the surface soil (Figure 4.1-2). The Area 5 sample is above site-specific background levels and is close to the edge of the property, with no additional samples to the north to bound these concentrations. In addition, a few samples with concentrations above background represent relatively large areas of potential contamination, as there are no other samples nearby. These include the Area 7 sample and SS-457.

c. “Industrial” is misspelled in the legend of all three figures.

Response No. 232: Legends will be reviewed and corrected as necessary.

USEPA Reply: In addition, please address comment "b" above by indicating in the text what is shown on the figures as incomplete delineation of arsenic in surface soils.

Olin Response to USEPA Reply: *As discussed in the November 19, 2013 meeting with USEPA, arsenic concentrations in soil within the property boundaries represent background conditions. USEPA concurs that elevated arsenic are present due to railroad operations along the Pan AM railroad bed (west of the property) and EA5 (MBTA railway east of the property). Olin will include these discussions in the draft OU1/OU2 RI and USEPA concurrence that the nature and extent of arsenic is delineated. See Response to Comment No. 200.*

Comment No. 233: *Figures 4.1-8 through 4.1-10: In several locations, samples exceed the RSL and are not bounded by relatively clean samples.*

a. Hexavalent chromium may not have been fully delineated in the surface soil to the west of SB-506 (Figure 4.1-8), which is above the RSL. Note that another exceedance of the RSL is located to the southwest as well (SB-510).

b. In Figure 4.1-9, hexavalent chromium exceeded the RSL in SB-510. There are no shallow subsurface samples to the northwest, so delineation may not be complete in this area. Hexavalent chromium also exceeded the RSL in SB-510, which does not have any samples to the west.

c. Figure 4.1-10 shows relatively few hexavalent chromium samples. Three samples exceed the RSL and do not have outer samples to bound the concentrations: SB-518 (nothing to the north and northwest of this relatively high concentration), SB-521 (nothing to the west), and SB-525 (nothing to the south or east).

Response No. 233: Figure 4.1-10 presents hexavalent chromium data for deep subsurface soils (deeper than 10 ft bgs and below the water table). There is no current or foreseeable human or ecological exposure to the isolated soil where these samples were collected.

USEPA Reply: The purpose of Section 4.0 is to present the extent of contamination regardless of whether there are current or foreseeable exposures. Hexavalent chromium concentrations do not appear to be well delineated at any of the three levels presented on the figures. Hexavalent chromium analysis has been extremely limited relative to analysis for other contaminants at the Site as shown on the draft RI figures (soil – Figures 4.1-8 through 4.1-10; surface water – Figure 4.1-31; and sediment – Figure 4.1-39). Because these are RI figures, they do not show exposure areas and may have data that were eliminated from the HHRA. There are no similar figures for just the HHRA samples. Based on the tables, the following was developed:

The COPC selection tables for the HHRA indicate the following total number of samples evaluated for hexavalent chromium by media:

- 72 surface soil samples;
- 31 subsurface (1-10 ft) soil samples;
- 12 surface water samples; and
- 13 sediment samples.

Looking at the data tables in the HHRA Interim #2 (Attachment #2) (data used in the HHRA only), the breakdown by exposure area is as follows:

Surface soil-

i. Exposure area 1 – 22 samples;
ii. Exposure area 2 – 4 samples;
iii. Exposure area 3 – 1 sample;
iv. Exposure area 4 – 5 samples;
v. Exposure area 5 – 16 samples;
vi. Exposure area 6 – 23 samples;
vii. Exposure area 7 – 1 sample; and
viii. Containment area – 0 samples.

Subsurface soil (1-10 ft)-

ix. Exposure area 1 – 29 samples;
x. Exposure area 2 – 0 samples; wetland
xi. Exposure area 3 – 1 sample;
xii. Exposure area 4 – 0 samples; wetland/conservation area
xiii. Exposure area 5 – 0 samples; wetland
xiv. Exposure area 6 – 0 samples; wetland
xv. Exposure area 7 – 1 sample; and
xvi. Containment area – 0 samples.

Surface water:

xvii. South Ditch – 4 samples;
xviii. Stormwater Detention Pond – 1 sample;
xix. Central Pond – 1 sample;
xx. East Ditch – 4 samples;
xxi. Off-Prop West Ditch – 2 samples;
xxii. MMBW – 0 samples; and
xxiii. Landfill Brook – 0 samples.

Sediment:

xxiv. South Ditch – 8 samples;
xxv. Stormwater Detention Pond – 2 samples;
xxvi. Central Pond – 2 samples;
xxvii. East Ditch – 0 samples;
xxviii. Off-Prop West Ditch – 1 sample;
xxix. On-Prop West Ditch – 0 samples;
xxx. MMBW – 0 samples; and
xxxi. Landfill Brook – 0 samples.

Please indicate in the text that this lack of data indicates a data gap for hexavalent chromium that needs to be addressed. See HHRA Interim Deliverable #2, Comment No. 53b.

Olin Response to USEPA Reply: *As discussed with USEPA during the November 19 2013 meeting, the presence of hexavalent chromium represents a subset of the chromium distribution data, which is an extensive data set. In the meeting, the conclusion of this discussion resulted in a recognition that a strong correlation between total chromium and hexavalent species was not supported by the data but that a process could be developed to address USEPA concerns for areas where hexavalent chromium was not analyzed or has few samples (less than 3)*

Attachment 7 of the HHRA Second Interim Deliverable contains a discussion regarding the relationship of hexavalent chromium to total chromium in soil. The discussion concludes that hexavalent chromium is a relatively small percentage of the total chromium detected in soil at OU1 and OU2. Hexavalent chromium is often non-detect in samples for which total chromium is relatively elevated or the ratio of hexavalent chromium to total chromium is often quite low for the higher detections of total chromium. Box plots included in Attachment 7 indicate the spread (quartile range) of total chromium and hexavalent chromium data are not consistent with one another. These findings indicate a general lack of correlation between total chromium and hexavalent chromium concentrations in soil for OU1 and OU2. Surrogate hexavalent chromium concentrations derived for the higher detected total chromium concentrations, using the ratio derived, would result in surrogate hexavalent chromium concentrations that are not likely representative of actual hexavalent chromium concentrations at the Site. Therefore, it would not be appropriate to convert total chromium data to hexavalent chromium concentrations in soil at OU1 and OU2 for purposes of the HHRA. Total chromium soil concentrations should be evaluated as trivalent chromium based on the analysis.

As discussed at the November 19, 2013 meeting at USEPA it was agreed for the HHRA, for a given medium, at any exposure point with fewer than three hexavalent chromium results, an estimate of the hexavalent chromium concentration will be calculated. The estimated hexavalent chromium concentration will be calculated by applying a ratio to each total chromium result for a specific exposure point and medium. The ratio will be the 95% UCL on the mean for the ratio of hexavalent chromium to total chromium for all samples in that medium that have both total chromium and hexavalent chromium results. This estimated hexavalent chromium concentrations will be used to calculate EPCs for those scenarios that have fewer than 3 measured hexavalent chromium concentrations at an exposure point.

Comment No. 234: Figures 4.1-11 through 4.1-13:

a. In Figure 4.1-12, TMP exceedances of the calculated industrial RSL were detected in SB-475 through SB-477. Given that these concentrations are at the property boundary, it

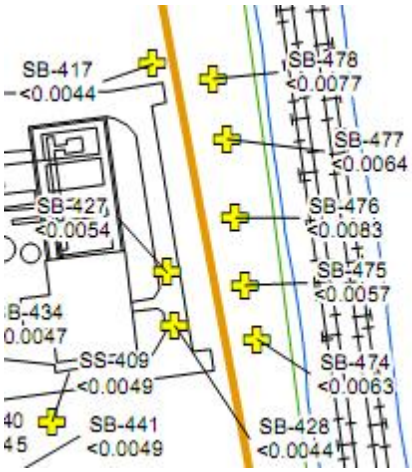
is possible for additional soil contamination to be located across the railroad tracks to the east. Therefore, TMP has not been fully delineated in this area.

b. In Figure 4.1-13, TMP exceedances of the calculated industrial RSL were detected in SB-427 and SB-476 through SB-478. No samples are located to the north or east, suggesting that TMP has not been delineated in this area.

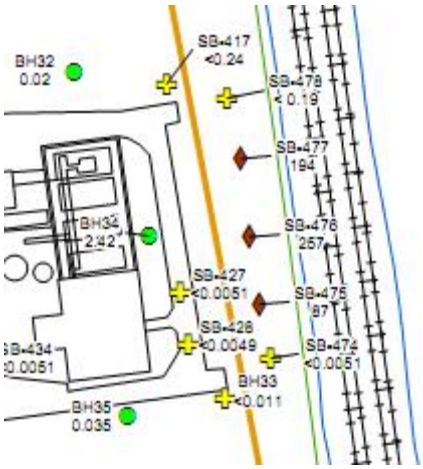
Response No. 234: Samples are located North and South. EPA has acknowledged there is no need to sample to the east and that the railroad embankment prevents this. Olin does not understand why this comment keeps coming up when it was resolved in meeting and on-site discussions.

USEPA Reply: On Figure 4.1-13 the northern most sample exceeds the calculated industrial RSL. Because the figures demonstrate contamination above screening levels, with no apparent closure to the extent of contamination, the text needs to explain why this is not an issue. EPA understands that the tracks limit sampling to the east. An explanation is needed for **why** sampling to the north has not occurred.

Olin Response to USEPA Reply: *TMPs at SB-478 (0-1 and 1-10 feet below grade) have been delineated and at the northern boundary are below RSLs (see data from RI figures below). At a depth greater than 10 feet, soils are below the water table. Soil boring SB-478 was drilled on November 18, 2010. A water level from an adjacent well (IW-6) was collected on November 15, 2010. Depth to water was 9.90 feet. Soil sample SB-478 (greater than 10 feet) was collected at 10 to 12 feet below grade (within the water table). Refusal was noted at 12 feet. The TMPs are associated with the LNAPL smear zone at Plant B and the northern most LNAPL extraction (EW-12) well has not historically recovered any significant LNAPL volume indicating this well is located near the northern edge of the release area and that the smear zone is not expected to extend much farther to the north.*



0-1 feet



1-10 feet

Further delineation to the north is hampered by heavily vegetated / wooded terrain that is uneven and would require clearing along the MBTA railroad right of way. A little further north are areas of bedrock outcrop indicating a limited extent of overburden providing a physical boundary to the potential northern extent of the former LNAPL smear zone.

Comment No. 237: Figures 4.1-29 through 4.1-36: Based on high frequency of detection in one or more OU2 surface water body and presence at concentrations exceeding screening levels, additional figures presenting surface water results should be provided in the RI for the following contaminants:

- Aluminum
- Manganese
- Arsenic
- Barium
- Cobalt
- Copper
- Chromium
- Iron
- Zinc
- PAHs
- Bis-2-ethylhexyl phthalate
- 1,1-Dichloroethane
- TCE
- N-nitrosodiphenylamine

Response No. 237: Additional figures for Site-related parameters will be considered.

USEPA Reply: Please verify that contaminants exceeding screening levels are represented on additional figures. There is currently no mutually agreed upon list of "Site-related" contaminants. See HHRA Interim Deliverable #2, Comment No. 1.

Olin Response to USEPA Reply: *At the November 19, 2013 meeting, Olin indicated it will identify the group of chemicals that were used as raw materials, produced as products, or were known to have been released at the facility as "chemicals of interest". The constituents released can further be documented by their presence in DAPL and diffuse groundwater. As discussed with USEPA these chemicals of interest also include metals, inorganic compounds, and organic compounds that either occur naturally or are common anthropogenic contaminants in the environment and the presence of such constituents is not by itself evidence that the detection is related to a release from the Site. In this context the term Site-related is unfortunate since it often can result in an incorrect presumption that a detection equates to evidence of a release and an incorrect conclusion can result as to the actual source of a detected compound or element.*

Chromium distribution in surface water is already presented in Figure 4.1-30

1,1-Dichloroethane and TCE do not have AWQCs for comparison purposes. Furthermore, a total of five samples had TCE detections and two had 1,1-DCA detections from 58 total samples. Neither 1,1-DCA nor TCE is not detected in South Ditch, but are detected in East Ditch either downstream of E.C. Whitney and Son's or upstream of the Olin Property near Raffi and Swanson. 1,1-DCA is also detected in Landfill Brook. Based on the limited number of sample results, the distribution of

detections, these constituents are un-related to the Olin Site and do not warrant figures for the OU1/OU2 RI.

BEHP and NDPA do not have AWQCs. Of the 58 samples collected, only five had detectable concentrations for BEHP and two had detectable concentrations of NDPA. BEHP was detected in South Ditch (twice) and East Ditch (twice) and Landfill Brook (once). NDPA was detected twice in South Ditch. Based on the limited number of analyte detections, and the obvious relationships in East Ditch and South Ditch detections, additional figures are not warranted to understand distribution.

Aluminum, copper, and iron are frequently detected compounds and exceed their respective AWQC (chronic) criteria. In most cases the average concentration also exceeds their respective AWQC. Aluminum and iron are metals associated with the Floc in South Ditch but are highest in concentration in Landfill Brook. Figures for Aluminum, and iron will be added to the draft OU1/OU2 RI. Copper is present in all surface water bodies within a similar range of concentrations and does not warrant a figure since copper does not appear to be related to a release from the Site.

Arsenic and zinc concentrations are high frequency detected compounds but do not exceed their respective AWQC (chronic) criteria and do not warrant presentation in a figure.

There is no specific AWQCs for PAHs. PAHs were infrequently detected in surface water samples. PAHs are not detected in South Ditch surface water, and most frequently detected in off-Property West Ditch and East Ditch which are adjacent to railroads which are known to be an anthropogenic source of PAHs (diesel exhaust and creosote treated ties). Based on the obvious association of PAHs with railroad operations a figure for PAHs is also not warranted.

Barium, cobalt, and manganese do not have AWQCs. Although they have high frequency of detections these compounds are common naturally occurring elements (metals) and are also detected in virtually every soil sample collected at the Site and are not associated with environmental releases from operations at the Site. Surface water figures for these metals would not contribute to understanding the nature of releases from the Site.

STAKEHOLDER COMMENTS

GeoInsight Comments (provided to EPA on July 2, 2013)

Comment No. 1: Additional cross-sections would be helpful in demonstrating that the impacts at specific source areas have been adequately defined/delineated (e.g., the extent of trimethylpentene impacts in the vicinity of Plant B production area, and processing oils and associated analytes in the vicinity of the Plant B tank farm) should be depicted on the figures with corresponding analytical results.

EPA Response: *EPA concurs. Olin/AMEC should prepare additional cross-sections aligned through former known source areas.*

Olin Response: It is our understanding that the reviewer intends to see local impacts with depth. Creating the requested cross-sections will be cumbersome and time consuming. We offer the following as a means of providing the requested information in less time. Several plan view figures will be prepared for soils in the area of Lake Poly, Plant B, and TMP area. The figures will focus on chemicals with soil concentrations greater than Industrial RSLs (IRSLs). Each plan view figure will include analytical data in chem-boxes, showing analytical results for multiple samples collected at various depths.

USEPA Reply: EPA disagrees with the suggestion that plan view figures will provide sufficient information. Please prepare cross-sections as requested.

Olin Response to USEPA Reply: *The PRI and draft OU1/OU2 RI, have always summarized data in Plan View Figures (to facilitate presentation of nature and extent). Olin will prepare one representative section through Lake Poly, Plant B and the TMP area.*

Comment No. 8: It appears that several contaminants have not been fully delineated in OU1 (including hexavalent chromium).

EPA Response: *EPA concurs. See Nobis RI comment No. 233a, b and c.*

Olin Response: Although the comment references “several contaminants”, only one (hexavalent chromium) is identified in the comment or in USEPA’s response to the comment. This response addresses the identified chemical. The questions posed by these three comments (233.a, b and c) pertain to the delineation of hexavalent chromium on the western side of the property. The nature and extent of hexavalent chromium in the subject area has been adequately characterized. We have provided our rationale for this conclusion below.

Our rationale is based on a three-pronged weight of evidence:

- **Lack of human health or ecological risk,**
- **Sufficient understanding of site conditions, and**
- **Data suitability with respect to Remedial Decisions**

Each of these lines of evidence is discussed in more detail below.

1. Lack of Human Health Risk.

   The hexavalent chromium concentrations observed in OU1 soils do not pose any unacceptable risk to human health or the environment, especially along the western boundary of the property. The highest concentration of hexavalent chromium in surface soil in that area is 11 mg/kg and in shallow subsurface soil is 28 mg/kg.

   The health risks (ingestion, dermal contact, and inhalation of dust) associated with the maximum existing hexavalent chromium concentrations in surface soil in the subject area are 2×10^{-6} cancer risk and 0.04 non-cancer hazard quotient. The cancer risk is at the low end of the EPA cancer risk range (10^{-6} to 10^{-4}) and the hazard quotient is well below 1. The corresponding health risks for the maximum concentration in shallow subsurface soil are 5×10^{-6} cancer risk and 0.09 non-cancer hazard quotient. These values are also not actionable risks.

   We have reviewed the relative concentrations of total chromium and hexavalent chromium and the result of this assessment arrives at the same point: hexavalent chromium impacts in the subject area pose no unacceptable risk to human health or the environment. Please find attached a marked-up copy of Figure 4.1-5 of the Draft RI Report that shows total chromium concentrations in surface soil as well as the location of SB-506 that was analyzed for hexavalent chromium. Total chromium concentrations in surface soil provide an absolute upper boundary on the potential hexavalent chromium concentrations in soil (hexavalent concentration cannot be greater than total chromium concentration). The area bounded by the red hand-drawn line includes the area west and northwest of the surface soil sample SB-506 that was analyzed for hexavalent chromium. That area has 12 surface soil samples that were analyzed for total chromium. The average total chromium concentration in that area is 18.6 mg/kg, with a range of 6.9 mg/kg to 32 mg/kg (not indicative of any substantial release). For all of the available data for co-located hexavalent chromium and total chromium in OU1 soil samples, the ratio of hexavalent chromium to total chromium ranges from 0.001 to 0.12 with an average ratio of 0.03. This suggests that hexavalent chromium concentrations in surface soil west and northwest of SB-506 likely have a low end of approximately 0.0069 mg/kg to 0.83 mg/kg and a high end of approximately 0.032 mg/kg to 3.84 mg/kg. This indicates that hexavalent chromium concentrations in surface soil west and northwest of SB-506 are likely less than the RSL of 5.7 mg/kg. **Even if all of the reported total chromium in the 12 samples west and northwest of sample SB-506 was hexavalent chromium, the**

estimated cancer risk would be only approximately 3 x 10^{-6} (negligible) and the hazard quotient would be only 0.006 (also negligible).

2. Sufficient Understanding of Site Conditions:

   Hexavalent chromium detections along the western portion of the property are presumed to exist because of past practices during site operation (potentially associated with Lake Poly and the dry storage areas). However, the area west of Lake Poly and the dry storage areas are mainly wetland areas where no past operation was known to exist. Therefore, from a conceptual standpoint, it is presumed that impacts in this area were there due to over-land flow. The topography in this area rises toward the Pan AM Railways tail track west of the property so that there exists a topographical boundary to any surface flow that may have resulted in the impacts that are currently observed. Based on this information, migration of impacts west of current sampling locations is improbable. Additionally, railroad tracks are constructed using wooden cross ties that are typically treated with CCA (chromated copper arsenate), so the closer we get to the railroad tracks, the more likely it is that chromium, if found, would be associated with the railroad cross ties.

3. Data Suitability with Respect to Remedial Decisions:

   As indicated above, the concentrations of chromium along the west portion of the property are well below actionable risks and the distribution of chromium is well documented especially when older remedial delineation and confirmation samples are considered. Fourteen samples, spaced at approximate 25 foot intervals, are located within twenty feet of the property boundary (See attached Figure 1) and clearly define chromium nature and extent To the west of these sample locations, the potential extent of the chromium impacts is also limited by the presence of the railroad spur topographically. Therefore, the existing data is sufficient to characterize risk, to assess the nature and extent of impacts, and to use in remedial decision making as part of the Feasibility Study for OU1 and OU2.

   Specific detailed responses to comments 233 - a., b., and c. of the Nobis comment are presented below.

   a. Please find attached a marked-up copy of Figure 4.1-5 of the Draft RI Report that shows total chromium concentrations in surface soil as well as the location of SB-506 that was analyzed for hexavalent chromium. Total chromium concentrations in surface soil provide an absolute upper boundary on the potential hexavalent chromium concentrations in soil (hexavalent concentration cannot be greater than total chromium concentration). The area bounded by the red hand-drawn line includes the area west and northwest of the surface soil sample SB-506 that was analyzed for hexavalent chromium. That area has 12 surface soil samples that were analyzed for total chromium. The average total chromium concentration in that area is 18.6 mg/kg, with a range of 6.9 mg/kg to 32 mg/kg

(not indicative of any substantial release. For all of the available data for co-located hexavalent chromium and total chromium in OU1 soil samples, the ratio of hexavalent chromium to total chromium ranges from 0.001 to 0.12 with an average ratio of 0.03. This suggests that hexavalent chromium concentrations in surface soil west and northwest of SB-506 likely have a low end of approximately 0.0069 mg/kg to 0.83 mg/kg and a high end of approximately 0.032 mg/kg to 3.84 mg/kg. This indicates that hexavalent chromium concentrations in surface soil west and northwest of SB-506 are likely less than the RSL of 5.7 mg/kg. **Even if all of the reported total chromium in the 12 samples west and northwest of sample SB-506 was hexavalent chromium, the estimated cancer risk would be only approximately 3 x 10^{-6} (negligible) and the hazard quotient would be only 0.006 (also negligible).**

b. Please find attached a marked-up copy of Figure 4.1-6 of the Draft RI Report that shows total chromium concentrations in shallow subsurface soil (1 – 10 ft bgs interval) as well as the locations of SB-509 and SB-510 that were analyzed for hexavalent chromium. The sample from SB-510 (7-9 ft bgs) was collected near the northwest edge of the Lake Poly excavations (upland area). That sample was collected just above the water table (identified at 9 ft bgs). The sample from SB-509 (1 – 3 ft bgs) was collected immediately adjacent to the on-property West Ditch. This sample was collected from the wet area adjacent to the ditch. There are numerous soil samples analyzed for total chromium in the area of Lake Poly and the drum storage area immediately to the west of Lake Poly. Those samples generally have total chromium concentrations indicative of residual Lake Poly impacts. However, the area west of the drum storage area is a wetland (outlined in yellow on the marked-up Figure 4.1-6), and the total chromium concentrations reported for shallow subsurface soil samples collected from the wetland (samples and results outlined in red) are much lower than in the upland area (ranging from 5.8 mg/kg to 39 mg/kg with a mean of 17.2 mg/kg). These concentrations represent theoretical upper limits on hexavalent chromium concentrations.

For all of the available data for co-located hexavalent chromium and total chromium in OU1 soil samples, the ratio of hexavalent chromium to total chromium ranges from 0.001 to 0.12 with an average ratio of 0.03. In the wetland area west of the drum storage area, total concentrations in shallow subsurface soil samples range from 5.8 mg/kg to 39 mg/kg (concentrations are not indicative of any substantial chromium release). Applying the observed ratios of hexavalent chromium to total chromium, the hexavalent chromium concentrations likely range from 0.0058 mg/kg to 0.70 mg/kg on the low end and from 0.039 mg/kg to 4.68 mg/kg. This indicates hexavalent chromium concentrations in shallow subsurface soils are likely below the RSL of 5.6 mg/kg. **Even if all of the reported total chromium in the samples west and northwest of sample SB-506 was hexavalent chromium, the estimated cancer risk would be only approximately 3 x 10^{-6} (negligible) and the hazard quotient would be only 0.0055 (also negligible).** In addition, most of the

shallow subsurface soils in the wetland are within the water table and are included in OU3.

c. The samples identified on Figure 4.1-10 of the Draft RI Report were collected from depths greater than 10 ft bgs and within the water table. Therefore, these samples are related to and will be evaluated in OU3. There is no foreseeable human or ecological receptor exposure associated with those samples.

USEPA Reply: Several other Nobis RI comments discuss questions regarding delineation of areas or contaminants other than hexavalent chromium, specifically, Nobis RI comment Nos. 144, 175, 232b, 234a, 235a, b, c, and 236a and b. Please refer to these comments for further discussion. Regarding hexavalent chromium and the arguments above, delineation should be completed regardless of risk. The purpose of delineation is for determining the nature and extent of contamination. Hexavalent chromium analysis has been extremely limited relative to analysis for other contaminants at the Site as shown on the draft RI figures (soil – Figures 4.1-8 through 4.1-10; surface water – Figure 4.1-31; and sediment – Figure 4.1-39). Because these are RI figures, they do not show exposure areas and may have data that were eliminated from the HHRA. There are no similar figures for just the HHRA samples. See discussion of number of available hexavalent chromium samples by media and exposure areas in Comment No. 233 above.

Olin Response to USEPA Reply: *Please see Olin's response to Comment 233 referenced above.*

CDM Smith Comments (provided to EPA on July 2, 2013)

Specific Comments on the April 19, 2013 draft of the Remedial Investigation Report for Operable Unit 1 and Operable Unit 2

Comment No. 3: Comments on Table 4.1-1 to Table 4.1-3

e. Table 4.1-3 (for soils deeper than 10 feet (ft) in depth) appears to receive no follow-up in the risk assessment document – are these soils being excluded from the risk assessment?

EPA Response: *Soils deeper than 10 feet in depth are excluded from the risk assessment with EPA consent because receptors are not expected to contact soils at these depths. This is standard EPA practice. Interaction between groundwater and soil deeper than 10 feet (or less than 10 feet deep where the water table is shallow) will be considered during the groundwater OU3 risk assessment.*

Olin Response: No response required.

USEPA Reply: Reminder: Although soils deeper than 10 feet in depth are excluded from the risk assessment, soils located above the water table, regardless of depth, need to be (and are) included in the Nature and Extent discussions of the OU1/OU2 RI. EPA recommends discussion of unsaturated soils in the greater than 10 ft depth range separately from saturated soils in this depth range. EPA also recommends discussion of unsaturated soils in the 1-10 ft depth separately from saturated soils in this depth range and exclusion of saturated soils from the HHRA. (Note saturated soils of both depth ranges could be combined.) As noted, soils below the water table will be considered under OU3.

Olin Response to USEPA Reply: *Saturated soils greater than 10 feet (or less than 10 feet where the water table is shallow) will be discussed in OU3. There are no locations where the unsaturated soil thickness is greater than 10 feet. The only exception might be in the immediate vicinity of the extraction wells at Plant B, and the impacts at Plant B will be considered further as part of OU3.*